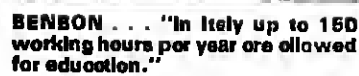


The Argus M700 mini, like the new clivic 700F and G versions, is a reimplementation of the processor using AMD 2901 bit-slice microprocessors. It is similar to

\_\_\_\_\_



The Cambridge machine can be configured to look like a 115, 125 or 135 by changing the

Existing users of Accuscan equipment have been told that the company will buy back the equipment on a time-used basis, or will maintain it until 1985.



be Maurice Glynn, of Plessey Telecommunications, Liverpool; Jack Donnelly of Communications and Data Systems, Beeton, Nottingham; Eric Clark, Plessey Controls, Poole, Dorset; Gordon Patterson of Telecommunications Research, based in Taplow, Berks; and John McDonald of Overseas Operations.

Another local company, Dak-tor, which has acquired the franchise to manufacture the American General Automation systems (CW, April 20) expects local production to begin later this year.

**NETWORK BLIND ALLEY?**  
Most European PTTs are dove

dilemma that faces those authori-  
ties is examined by Fred Lamond  
Marketview in this month's Inter-  
national section: Circuit switching  
packet switched or leased channels  
which is the right system? Or are  
they all blind? See page 20/21

Palmer, and reports on the American scene by Hersh Wiesner and

8086, has a product available as yet, with Zilog's Z8000 due towards the end of this year and Motorola's 68000 expected early next year.

Mostek is showing a new family of microcomputer boards that meet the needs of the STD bus which has been jointly developed by Mostek and Pro-Log. The boards feature a new 56-way bus structure and are the single-card microcomputer of the family. It is based on the company's version of the Z80 microprocessor.

The semiconductor division of Marria is exhibiting Micro 12, a \$550 all-CMOS board computer which can run PDP-8 programs directly. It is based on the HM 6100 CPU, a second-source version of the Intersil 6100 12-bit device.

For PDP-11/03 and LSI/11 systems from Digital Equipment, Datel Systems is showing a new range of A/D and D/A converter cards which fit in to DEC card cages, providing an analogue signal front-end capability for these systems.

The order is a big blow for IBM UK, representing the loss of possible orders for four large 600M computers.

the 370/168s would have been replaced by 3033s while the V/5s are likely to replace an order for two 3032s which British Airways were negotiating with BBA as replacements for five ageing

A switch to a plug compatible mainframe supplier by British Airways is in line with its past computing policies. Most of the peripherals on the British Airways mainframes come from plug compatible vendors, and over two years ago, British Airways terminated its maintenance contract with IBM, signing up Data Processing

## ICL 2976

DESPITE some opposition from its regions, the Central Electricity Generating Board headquarters is to get an ICL 2976 provide conversion facilities for 2000 systems that will be

be developed and implemented in native mode. Existing applications will be gradually converted over a period of about three years using online terminal links to the 2976.

The two 2960s going to the South Western regional centre will be DME machines because a number of new systems there are at a more advanced stage of development on existing 1904S kit and need the extra power that the 2960 can provide, even when running under DME.

A CEBG spokesman said that the 2978 might be sold to CompuTel at the end of the three-year conversion period although he stressed that the deal had not yet been finalized.

THE legal action in the U.S. against Inmos in which Mostek is attempting to enjoin its former employees from passing on trade secrets is being pursued by Mostek. Former Mostek employees now working for the British company include financial manager and deputy managing directors, Richard Petritz and Uwe Schlegel.

A Dulles court granted Mukteka a temporary injunction against Inmos early last month (CW, August 17), and on Monday the two parties appeared in court to enable the judge to issue what US law terms a preliminary injunction. This is forced until the full case is heard.

Mostek's action is essentially over methods used to fabricate the 64K RAMs which Mostek intends to introduce and which Inmos will probably emulate in manufacture.

# COMPUTER MARKETING

Ecfield House 641 London Road West Thurrock Essex  
☎ Purfleet (04026) 7161 Telex-896786  
City Showroom 15 Bevis Marks London EC3  
☎ 01-283 3974  
Rental & Leasing facilities available

**THERE** are to be three parts to the Department of Industry's £16 million scheme to support the application of microcomputers (CW, July 13). Part A, to be administered by the National Computing Centre, will get £2 million and cover training and "industry awareness." Part B, to be run by Warren Springs Laboratory with £3 million, will provide funds to help with feasibility studies carried out by DoI authorised consultants. Firms will be obliged to pay £2,000 on the way into the use of computers and production. The bulk of the money will be used on the themes, which are: the use of microcomputers with firms' existing equipment; for 400 to 4,000 users; and for 4,000 to 10,000 users. The Department is expected to be asked to fund a further £5 million in approving projects have been

**370/135.100**  
**AVAILABLE IMMEDIATELY**  
**FDR RENTAL**

One-year contract — £5,000 per month — features 4655, 4640, 4722/3/4, 4672, 8837, 7855, 6981, 7861, 7862, 3048, 3215.

- 7 x 10 High legibility dot matrix
- 1920 Character (24 x 80) display
- Programmable dual intensity
- Switchable reverse video
- Full cursor controls
- Separate numeric keypad
- Auxiliary output port
- CCITT V24 and 20ma interfaces
- Screen editing with block transmission
- Protected/Unprotected fields
- Microprocessor printer buffer

**RAIR**  
30-32 Neal Street, London WC2H 9PS  
Telephone 01-836 4663, Telex 798452

AN international marketing agreement has been reached between Digital Equipment Corp., Warren Point, of Steve Wozniak, that provides the MICA compiler, a machine independent compiler for the A automatic test program

providing the MICA pack.  
the US, MICA will be av  
under a licence agreement

group Thomson-CSF that lead to a joint semiconductor design and manufacturing operation in France similar to the joint venture being established in the UK by GE and Fairchild. The French company already near to launching its own semiconductor

**NETWORK BLIND ALLEY?**  
Most European PTTs are dove-

## VOICE OF THE USERS

As in Europe, data communications is one of the expanding areas for the application of computers and networks. The section is beginning to make their voices heard in the policy making debates. Morris Edwards looks at some of the latest moves in the game. Page 18

## ALSO

Guest Computerview by Heath

**APPOINTMENTS**  
**PAGES 20-26, 38-63**

**CIFER SYSTEMS LIMITED** Computer and Ancillary Equipment

CUB is an incredibly low-cost Visual Display Terminal comprising a rugged 80 key keyboard, 12" CRT Displaying 12 lines of 64 char upper and lower case characters, numbers and underlines feature. 8 selectable line shades in the range 80 to 1200 EPS

**FROM £285**

**SEERIS 928** Compact well styled visual display terminal features separate contactless keyboard, anti-glare screen, high definition 7 x 12 dot upper and lower case character set. Standard model includes CCITT V24 and 20mA interface, 8 selectable transmission speeds, 24 lines x 80 characters, single and double line spacing, double width characters plus 14 other selectable char set, auto-high-contrast, video output port, cursor addressing



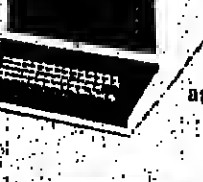
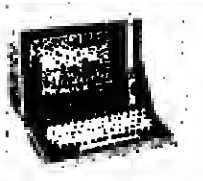
**FROM £260.**

**SEERIS 324** High quality paper buffered terminal features separate 84-key keyboard including numeric and control clusters, anti-glare screen displaying 1920 high definition 7 x 12 dot characters from the full ASCII repertoire. Models available in this series with dot matrix, proportional font, labutination, customer defined character sets and keyboards. Communication facilities include pseudo-synchronous operation

**FROM £750.**

Our terminals are manufactured in the U.K. All models are covered by a 12 months warranty and packed by a capable technical support and service organisation.

Avo Way, Bowerhill, Melksham  
Wiltshire SN12 6TP  
Telephone Melksham (02945) 700366 & 704500





## COMPUTER WEEKLY

Vol. 25 No. 818  
Thursday, September 14, 1978  
Editor  
Malcolm Pollitt 01-261 8033  
Deputy Editor  
Tony Higgins 01-261 8096  
Advertisement Manager  
Herry Hutson 01-261 8022  
Class Ad Manager  
Srian Durrant 01-261 8097

IPC Electrical Electronic Press Ltd.  
Conrad House, Stamford Street,  
London, SE1 8LU.  
Telephone: 01-261 8000.  
Telex: 51577 616 FRS 8

Branch Offices:  
Birmingham: 202 Lynton House, Watfoll  
Road, Birmingham B2 2B.  
London: 51577 616 FRS 8.  
Manchester: 51577 616 FRS 8.  
Sheffield: 51577 616 FRS 8.

© New York: 205 East 42nd Street, New  
York, NY 10017.  
Tel: (212) 867 2800. Telex: 421710

Published weekly on Thursday  
Registered at the Post Office as a  
newspaper. Price per copy 18p

© IPC Business Press Ltd 1978.

Members of Computer Weekly staff  
may be contacted directly on the  
assistance listed below. Other de-  
partments in Dorset House may be  
obtained by dialling (01) 261 8000.

**EDITORIAL**  
Keith Jones 261 8344  
Tim Palmer 261 8031  
Peter Hewitt 261 8303  
Nora Johnston 261 8028  
Martin Banks 261 8008  
Robin Webster 261 8178  
Bernard Allen 261 8036  
Donald Kerrall 261 8303  
Mike Marple 261 8042  
Don Mitchell 261 8042  
Dorell Rampal 261 8043  
Chris Youan 261 8043  
Nancy Pocock 261 8043

**ADVERTISING**  
Dagley 261 8757  
Lloyd Collins 261 8708  
Steve Moore 261 8708  
Stuart Bass 261 8028

Manchester  
Herry Hutson 061-872 4211

Birmingham  
Ken Parrott 021-358 4838

Classified  
Chris Prior 261 8028  
Edith Parrell 261 8087  
Mark Williams 261 8018  
John Farrer 261 8088  
Joan Poole 261 8174  
Nancy Pocock 261 8174

Manchester  
Owen Kelly 061-872 4211

Birmingham  
Bill McDonald 021-358 4838

Production  
Ken Carter 261 8018  
Ken Welford 261 8078  
Roger Allway 261 8078

Computer Weekly is sent free of charge to  
the following categories in the UK and Eire only:  
Company directors, company secretaries,  
management services executives, chief ac-  
countants, responsible tax assistants,  
managers/computer consultants, lec-  
turers and teachers, DP managers/  
supervisors, systems analysts & in-  
formatics, programmers, operators, computer  
scientists, and engineers.

Control of Circulation Department: IPC Business  
Press (Sales & Distribution) Ltd., 40  
Longway Lane, London E10 0NE. Tel:  
01-487 3081

Subscriptions for readers outside the above  
categories: one year, UK £14.00 overseas  
£20.00. Single copies 12p. Orders to:  
IPC, 40 Longway Lane, London E10 0NE.  
or nearest subscription agent.

Back numbers can be had on available for 40p  
post free.

Computer Weekly has a circulation  
each week of over 80,000 including the  
highest fully requested circulation in  
the UK. The international edition,  
which is published 16 times a year, has  
a circulation of over 54,000.

ISSN 0010-478

In this Guest Computerview, HESH WIENER, Computer Weekly's  
American correspondent, looks at a US presidential report on technology  
transfer.

## Big Brother for sale

LATE last month the White  
House sent the US Congress a  
44-page report on technology  
transfer. Technology transfer is,  
according to this paper, "the act  
of conveying know-how from  
one country to another."

The legislators may have got  
exactly what they asked for; but  
if they did, America is in trouble.  
The White House sent Congress  
nothing but pap.

While the report politely  
answered questions about nuclear  
weapons and military air-  
craft, it failed to address an issue  
that President Carter is quite  
familiar with, one that has made  
headlines recently and which  
promises to make more news in  
the immediate future: com-  
puters and how they shape the  
world.

That computers interest the  
military is without question;  
that they are important to the  
Administration may be inferred  
from President Carter's own ex-  
perience.

Just a few weeks ago the Presi-  
dent said he would refuse the  
Soviets a large Univac computer  
for Tass, the Russian news ser-  
vice (CW, July 20). The embargo  
was a response to the way the  
Russians treated a dissident com-  
puter scientist, Anatoly  
Schoransky. (However, Presi-  
dent Carter overlooked an IBM  
370 being installed for use at the  
Moscow Olympics.)

Earlier, the White House had  
turned down a Soviet bid to buy  
a Control Data Cyber 78. While  
the machine was supposed to be  
used for weather forecasting,  
President Carter acceded to the  
proposition that the computer  
could be diverted to military  
uses.

Even before he was  
nominated for the presidency,

## INTERRUPT

THIS is a tale of times long ago  
when the venerable Atlas 1st  
Chilton possessed sixteen 1in  
tape drives as its main backing  
store together with a high speed  
drum.

Being heavily used, the tape  
drives frequently developed er-  
rors, which involved switching  
the tapes from one deck to an-  
other.

One day the operators realised  
that a certain drive was per-  
forming particularly well. They  
without errors tapes that had  
failed on other decks. Then a  
system tape failed and it was  
duly transferred to the "good"  
drive. This led to a number of  
very heavy operating system  
crashes.

It was then realised that the  
good deck had really been ex-  
tremely naughty. For it had a  
fault of its own — it failed to  
register that it had detected bad  
data.

The moral: All that flatters is  
not good. Or don't rely on hard-  
ware checks alone.

● This week's £5 prize is won by  
David Fletcher of Wokingham,  
Berks.

then-governor Jimmy Carter,  
spoke to the National Computer  
Conference on the Importance  
of Information technology.

Computers comprise the larg-  
est single category of manufac-  
tured goods that the US exports  
and the odds are that computers  
will become even more lucrative  
during the coming years. Many  
other countries already pay  
homage to US technological  
leadership.

Even Eastern Europe has  
copied old American designs for  
its R&D series of mainframes.  
The Japanese have begun to  
compete in world markets; their  
offerings are beautifully-made  
copies of IBM equipment, some  
of them sold through American  
marketing organisations. In  
Germany the most dynamic fig-  
ure in the computer business,  
Hertz Nixdorf has unashamedly  
modelled his multinational or-  
ganisation after IBM. And so it  
goes around the world (with the  
exception of Britain's ICL,  
which has always taken an in-  
dependent design path).

Why, then, did the White  
House gloss over the transfer of  
such important technology in  
its report to Congress? The  
answer may lie with the entan-  
glement of computers and human

ONCE again, the formidable  
team of Computer Weekly,  
Nigel Laurie of Communication  
Audit, and the Institute of Data  
Processing Management, have  
joined forces to tackle the aplky  
problem of user relations (see  
page 15). Let's hope that this  
time round the users also get the  
communication message.

User departments appear to  
operate under somewhat dif-  
ferent procedures from the DP  
operation. It is not unknown for  
the entire user department to  
shut down and undertake a day  
trip to Runcom or perhaps com-  
pete in the company golf com-  
petition. In comparison, Com-  
putastars events are scheduled  
out of normal installation hours.

It takes two parties to estab-  
lish successful relations. The  
days when the DPM laid down  
the computer law have been  
long distributed along with  
much of the configuration.

No doubt there are still com-  
puter outposts of power, where  
DP law is standard company  
issue. Certainly user power  
hasn't yet infiltrated the bank-  
ing computing parlours. Bank-  
ing installations are noted for  
doing their own thing. Irrespec-  
tive of the needs of the users —  
whether customers or bankers.

It is strongly suspected that  
bank managers spend much of  
their time lurking in their cus-  
tomers' boardrooms as a method of avoiding  
troubling customers and incom-  
prehensible print-outs.

Outside the bank managers' board-  
rooms, the computer is a queue of dis-

rights. Computers are of parti-  
cular interest to dictators.

Although America shouts  
about human rights for dis-  
sidents in communist countries,  
it quietly automates the police  
forces of comparably repressive  
non-communist regimes. How-  
ever, it is more difficult to con-  
front capitalist neighbours to  
the south, such as the Brazilians,  
who have recently been allowed  
to buy automated fingerprint  
systems from Rockwell Inter-  
national (CW, July 13).

American companies have in-  
stalled their most advanced  
police communications products  
in Argentina (CW, March 31,  
1977).

Chilean refugees claim that  
the dictatorship there uses com-  
puters to keep files on its  
citizens, although the American  
companies that have sold sys-  
tems to that government deny  
that their machines are used as  
tools of repression.

The United States is not alone  
in its contribution of computers  
to questionable governments,  
nor is it without some remorse.  
The US has asked its computer  
manufacturers to reduce their  
dealings with South Africa, in  
particular with the sale of sys-  
tems for use by the South Afri-

cans.

Americans may well go down  
as the people that sold the world  
1984 — and called it technology  
transfer.

But at the same time, General  
Automation, the California  
minicomputer maker, licensed  
its designs to South African  
electronics manufacturers (CW,  
April 20).

If President Carter had not  
been brought close to this issue  
by his own experience or that of  
his Cabinet, he could scarcely  
have avoided the voices on  
Capitol Hill raised in question  
the wisdom of free trade in  
computer systems. Senators of  
differing views have spoken  
eloquently about the need to  
think deeply as we sell our com-  
puters to one brutal government  
or another.

It is not enough for the White  
House to take predictable stands  
on the control of nuclear know-  
how or the sale of electronic  
radar jammers. While tomorrow  
the United States might proudly  
face the historians as the nation  
that had sought to stop the  
spread of breeder reactors, it is  
more likely that it is headed for a  
less honourable place in the an-  
nals of mankind.

Americans may well go down  
as the people that sold the world  
1984 — and called it technology  
transfer.

It is not enough for the White  
House to take predictable stands  
on the control of nuclear know-  
how or the sale of electronic  
radar jammers. While tomorrow  
the United States might proudly  
face the historians as the nation  
that had sought to stop the  
spread of breeder reactors, it is  
more likely that it is headed for a  
less honourable place in the an-  
nals of mankind.

Americans may well go down  
as the people that sold the world  
1984 — and called it technology  
transfer.

It is not enough for the White  
House to take predictable stands  
on the control of nuclear know-  
how or the sale of electronic  
radar jammers. While tomorrow  
the United States might proudly  
face the historians as the nation  
that had sought to stop the  
spread of breeder reactors, it is  
more likely that it is headed for a  
less honourable place in the an-  
nals of mankind.

Americans may well go down  
as the people that sold the world  
1984 — and called it technology  
transfer.

It is not enough for the White  
House to take predictable stands  
on the control of nuclear know-  
how or the sale of electronic  
radar jammers. While tomorrow  
the United States might proudly  
face the historians as the nation  
that had sought to stop the  
spread of breeder reactors, it is  
more likely that it is headed for a  
less honourable place in the an-  
nals of mankind.

Americans may well go down  
as the people that sold the world  
1984 — and called it technology  
transfer.

It is not enough for the White  
House to take predictable stands  
on the control of nuclear know-  
how or the sale of electronic  
radar jammers. While tomorrow  
the United States might proudly  
face the historians as the nation  
that had sought to stop the  
spread of breeder reactors, it is  
more likely that it is headed for a  
less honourable place in the an-  
nals of mankind.

Americans may well go down  
as the people that sold the world  
1984 — and called it technology  
transfer.

It is not enough for the White  
House to take predictable stands  
on the control of nuclear know-  
how or the sale of electronic  
radar jammers. While tomorrow  
the United States might proudly  
face the historians as the nation  
that had sought to stop the  
spread of breeder reactors, it is  
more likely that it is headed for a  
less honourable place in the an-  
nals of mankind.

Americans may well go down  
as the people that sold the world  
1984 — and called it technology  
transfer.

It is not enough for the White  
House to take predictable stands  
on the control of nuclear know-  
how or the sale of electronic  
radar jammers. While tomorrow  
the United States might proudly  
face the historians as the nation  
that had sought to stop the  
spread of breeder reactors, it is  
more likely that it is headed for a  
less honourable place in the an-  
nals of mankind.

Americans may well go down  
as the people that sold the world  
1984 — and called it technology  
transfer.

It is not enough for the White  
House to take predictable stands  
on the control of nuclear know-  
how or the sale of electronic  
radar jammers. While tomorrow  
the United States might proudly  
face the historians as the nation  
that had sought to stop the  
spread of breeder reactors, it is  
more likely that it is headed for a  
less honourable place in the an-  
nals of mankind.

Americans may well go down  
as the people that sold the world  
1984 — and called it technology  
transfer.

It is not enough for the White  
House to take predictable stands  
on the control of nuclear know-  
how or the sale of electronic  
radar jammers. While tomorrow  
the United States might proudly  
face the historians as the nation  
that had sought to stop the  
spread of breeder reactors, it is  
more likely that it is headed for a  
less honourable place in the an-  
nals of mankind.

Americans may well go down  
as the people that sold the world  
1984 — and called it technology  
transfer.

It is not enough for the White  
House to take predictable stands  
on the control of nuclear know-  
how or the sale of electronic  
radar jammers. While tomorrow  
the United States might proudly  
face the historians as the nation  
that had sought to stop the  
spread of breeder reactors, it is  
more likely that it is headed for a  
less honourable place in the an-  
nals of mankind.

Champs'  
day at  
the Palace

THERE are 54 teams, 30 men  
and 24 women's, in the fi-  
nal line-up for the Computas-  
tars championships at Cyp-  
Palace, London, on Saturday  
September 30. The competi-  
tion is going to be fierce in this  
est athletic contest ever staged  
for computer people. It will be  
a great day out for the fan-  
tasy and advanced bookings have  
been heavy. These are a  
closed book tickets will be avail-  
able at the gate, 60p for ad-  
ults and 30p for children. Ref-  
reshments and bar facilities will  
also be available.

Trophies, given by  
Ferguson-Francis, will be pre-  
sented to the winning men's and  
women's teams, and trophies for  
individual men's and women's  
winners are being provided.  
Computastars Weekly, it is  
planned to give commenda-  
tions to all members of  
winning teams and to the  
three in the individual class.  
These are being presented by  
Wright Air Conditioning.

For competitors who  
knocked out of the contest in  
the day, the fun will be a  
big one. A big day has been  
set, with refreshing prizes  
the winners, and to exercise  
mind as well as the muscles.  
Teams are invited to enter  
slogans competition. The en-  
try will be displayed on the  
Crystal Palace electronic  
scoreboard and the winning  
try selected by a Computas-  
tars panel.

To round off the day, there  
will be a Computastars dis-  
cussion. This is a  
major competitors and  
partners but a limited num-  
ber of tickets is being made avail-  
able to supporters. The price is  
each including food and drink  
to the music of the Sun-  
Sound.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

The future may be uncertain.  
But good relations are by no  
means bleak.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

Computastars has been  
organised by Goldsmith Re-  
sults International with the  
support of Computer Weekly.

## 'IBM: THE NEXT FIVE YEARS' CONFERENCE

Shift from program  
to data design

THE 1980s will see a shift away from program design and towards data design and procedural languages like PL/I, Cobol and Fortran will be seen to have run their course. This is the view of Amdahl's senior vice-president for corporate marketing, Bill O'Connell, who was speaking at this week's second "IBM: the next five years" conference, organised by Infotech.

"There is a lot of data within  
programs which just should not  
be there," he said, citing as an  
example field lengths, which can  
cause a major upheaval in a  
system if, for example, an or-  
ganisation which uses a five-  
digit code for the employee  
identifier grows to the point  
where it takes on more than  
100,000 people.

"Data in the 1980s will be in-

dependent of classification, and  
dependent on its meaning to the  
business," he said.

"Applications will be depen-  
dent on business strategy, but  
independent of the current state  
of the business, so that they can  
accommodate change. And I be-  
lieve that the pace of change in  
business will speed up, rather  
than slow down, as companies  
try to become more com-

petitive."  
O'Connell saw this as a logical  
extension of the development  
from monthly response times in  
the early Sixties which became  
weekly, and then daily. In the  
early Seventies and are now  
down to 10 seconds.

Pointing out that a transac-  
tion in the 1960s required  
150,000 with the IBM IMS data-  
base system, he was confident  
that users would be able to ob-  
serve all the increases in com-  
puting power the industry could  
provide.

He also revealed that Amdahl  
was preparing for IBM to reduce  
the path lengths within IMS and  
to introduce a new disc subsys-  
tem with intelligent controller.

according to an Aston Martin  
spokesman.

The Cranfield micro system  
was intended to give the driver  
facilities such as instant  
readings of average speed and/  
or fuel consumption, but after  
some problems were encount-  
ered only a few prototype  
models were fitted with the  
equipment. Production of com-  
mercial models without the sys-  
tem has gone ahead and accord-  
ing to Aston Martin these  
should be ready for delivery  
early next year.

UKAEA's 2900 compiler  
to run IBM programs

TO ensure that user programs  
can be processed on its ICL  
equipment, compilers used by  
the United Kingdom Atomic  
Energy Authority have been  
adapted to cope with programs  
written for IBM systems. This is  
expansion of AEA computer  
power which has given ICL an  
order worth £13 million.

The equipment includes two  
dual 2976 systems and enhance-  
ments for the 2980 already in  
operation at Risley, Lancs (CW,  
May 25).

Each of the 2976s will have  
eight Mbytes of store and the  
2980 enhancements include a  
second order code processor  
with eight Mbytes of store, a  
further four Mbytes for the pre-  
sent OCP, and eight EDS 200  
disc drives.

The tuning of the 2900 com-  
piler to handle IBM programs  
will meet the needs of AEA  
users many of whom operate  
with IBM equipment, and in-  
cludes system run on the  
authority's own 370/168 at Har-  
well.

The compiler facility will also  
aid scientists from EEC coun-

tries and Sweden who will be  
working on the JET, Joint  
European Torus, project which  
is being established on a site at  
Culham.

A spokesman said that the use  
of an ICL DAP was still being  
considered (CW, May 25) but  
there were no immediate plans  
for such a system.

More details have also been  
released about F. W. Wool-  
worth's plans for a major 2900  
complex to serve the group's  
£800 million retailing operation  
(CW, August 17).

The £3.8 million order includes  
a dual 2980 due to be delivered  
next year and a dual 2972 for  
delivery in 1981. One of the  
2980s, a two Mbyte machine, will  
be used to develop programs  
under VME/B in preparation for  
the 2972 system.

Using George 3 DME, the  
other 2980, with one Mbyte, will  
gradually take over the present  
1900 workload which runs on  
two 1904S systems, a 1904A and  
a 1903A. The whole complex is  
scheduled to be converted to  
2980 working by 1982.

**GOVERNMENT COMPUTING**

**SCOTTISH OFFICE**

Computer Terminal equipment is required for installation at 6 locations in Edinburgh. VDU's having the functional characteristics of IBM 3270 terminals together with associated control units and printers, to link to the Scottish Office Computer Service IBM Main Frames is required at all 6 locations. Teletype compatible Terminals to link to any appropriate installation is required at 2 of the locations.

Proposals may be submitted for either or both of these requirements.

Applications for Operational Requirements quoting CEH/712 should be sent to arrive by 28 September, 1978 to:  
Central Computer Agency, Room 822  
Riverbank House, 187-181 Millbank, London SW1P 4RT



A speech synthesis circuit on a  
single P-channel MOS chip forms  
the heart of this learning aid, called  
Speak and Spell, from Texas In-  
struments. It has been designed by  
TI to help children in the 7-12 age  
group learn how to pronounce over  
200 basic vocabulary words that  
are often mis-spelled — like language  
and envious.

It pronounces each word ran-  
domly and the child keys in the  
spelling of it on the alphabetic key-

board. Speak and Spell then re-  
sponds either with praise or with  
encouragement to try again and,  
after a set of 10 words, it an-  
nounces the child's score. Speak  
and Spell can also teach pronun-  
ciation by displaying the word first  
and pausing to give the child a  
chance to say it out loud before  
giving the correct pronunciation.

Speak and Spell will be available  
in the UK later this year at a cost of  
about £35.

Operators  
accept  
original  
offer

THE operators at GEC  
Telecommunication's Stoke,  
Coventry plant, who went on  
strike for four months over a pay  
claim (CW, March 9), and then  
agreed to go to arbitration (CW,  
July 20), have now accepted the  
company's original offer.

They informed the company  
of their decision at a meeting  
between the management and  
the union held in Coventry last  
week. One of the operators said:  
"We couldn't agree on the ar-  
bitration. Anyway, the whole of the  
GEC, Coventry branch of  
ASTMS is to go before ACAS  
(the government's industrial  
and arbitration service) for next  
year's claim, so we decided to go  
along with that."

The pay rise comprises incre-  
ments of £2, £3 and £4 per week,  
for operators, senior operators  
and shift supervisors respec-  
tively. It is backdated to January  
1.

## THE NEW TALLY T3000

The new Tally T3000 is the 300 lpm printer for high  
quality, high volume performance with mini computers,  
small business systems and remote terminal instal-  
lations. It represents an evolution in the high reliability  
comb matrix printing technology first introduced by  
Tally with the T2000, of which 15,000 units have been  
installed throughout the world, consistently averag-  
ing over 1,500 hours MTBF.

The T3000 guarantees:  
■ A true 30



# DOWNTIME

by Chad

## Computer interrogation

Computer Man — Computer Man  
satisfies me If you can  
teach me the code  
teach me the signs  
teach me the language  
of your mind

Computer language can't  
express  
in Fortran, can it, warmth  
and depth?  
can Basic ever hope to tell  
what makes a friendship  
boom and gel?  
can loving, longing be  
replaced  
by synthesis on magnetic tapes?

Computer Man when you reply  
a Subject Package please  
supply  
for processing emotions by

can lonely walks  
Old Mozart nirs  
and table-tennis  
in mixed pairs  
and freckled hands  
that deftly play  
sweet songs to while  
the night away  
and twinkling eyes  
and yellow car ...  
a 'normans list  
lon long by far  
to feed into your computer — or

can such dear input be reduced  
in codes electric'ly produced?  
this is the package I require

## Who wants to be a millionaire

SOME interesting thoughts  
about Britain's microelectronic  
future from Daniel Yergin of  
the Harvard Business School  
writing about UK taxation and  
industrial policy in the  
magazine New Republic:

"I sat in on a discussion  
among influential, committed  
individuals on the left side of  
the Labour Party. They were  
debating microprocessors.

Was Britain to have its own  
microprocessor industry or  
not? If it did, then its very  
existence would involve the  
possible creation of new  
British millionaires. They  
didn't want any new British  
millionaires since they were  
still trying to figure out ways  
to get rid of the old inheriting  
kind. On the other hand, they  
admitted, without risking  
millions, such an industry  
was unlikely to get going in the  
UK, which would mean that  
Britain would import its  
microprocessors from the US  
— thus creating new American  
millionaires, or adding to the  
wealth of the existing Ameri-  
can millionaires.

"There was no question in  
the minds represented: better  
to prevent the rise of new  
British millionaires and let the  
industry remain in America.

This is not exactly an  
atmosphere conducive to in-  
dustrial reconstruction. The  
consequences of this environ-  
ment — of course, reinforced  
by traditional values and class  
barriers — is that such en-  
trepreneurial energy as there is  
in Britain goes into ventures  
like property speculation, a  
particularly unproductive and  
often unhealthy activity."

Elizabeth Proctor



"Tell me, Mr Robinson, how long  
have you felt you were a com-  
puter?" "011000011101110101  
clock cycles ..."

## Extra capacity for your mainframe

If you are finding that the capacity of  
your mainframe computer is limited then  
perhaps we can provide the answer.  
Instead of replacing your mainframe a  
more cost effective solution could be  
to add a local NORD computer system.  
Extra capacity can be added to suit  
your own particular requirements.

What is more, the NORD system can  
while performing local processing act as  
RJE — terminal offering simultaneous  
communications with most machines  
IBM, UNIVAC etc.  
NORD computer systems are used in  
industry, commerce, research and  
education throughout Europe.



**NORD — the system to build upon.**

Richard Norton (NORD) Ltd, NORD House, 17 Balfe Street,  
London N1. Tel: 01-2785501, telex: 299 537

## Here's what you would expect after 65,000 couplers.

Quite simply, the most thoroughly proven coupler technology in the world. Full CCITT  
specifications, universal cups, 300 baud operation, drift-free performance, switchable half or full  
duplex. Efficient, reliable, simple and superbly designed. What you would expect from the world's  
largest manufacturer of acoustic couplers. For full details fill in the coupon or contact us direct at  
Walton-on-Thames 44439 or Manchester (061) 236 8631.

Please send me coupler details

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_

**Special OEM  
terms  
available.**

**A211**

**ANDERSON  
JACOBSON**

Anderson Jacobson Ltd, The Estate Office,  
Station Approach, Shepperton, Middlesex

One of the subtle but nonetheless  
important changes brought about by the  
impact of information technology is the  
way it alters control of and access to  
information.

As pointed out in Computerview (CW,  
September 7), this change could  
exacerbate social divisions. But in this  
article, SAM FEDIDA, the designer of  
one of the most significant information  
technology inventions, the British Post

Office's Prostel viewdata TV-based in-  
formation service, suggests that the new  
technology could lead to a re-  
amphrasing of the value and importance  
of individuals and to a more informed and  
more participatory democracy. Fedida  
invented Prostel while working at the  
Post Office. He is currently a consultant  
on information services and is assisting  
the National Enterprise Board's Insee  
in the worldwide marketing of Prostel.

# The social impact of viewdata

TO TRY to discern what might  
be the social implications of  
viewdata is like trying to guess  
the social changes. Indeed the  
revolutions, in religious, philo-  
sophical and scientific thinking  
and changes in social and in-  
dustrial structures which we  
not know were the conse-  
quences of the introduction of  
printing by Caxton.

Looking back, we now know  
what enormous influence prin-  
ting has had on the daily lives of  
the common people. In liber-  
ating the human race from the  
slavery which might have been  
its fate for all times and not that  
the process is hardly completed.

As printing made possible the  
wide dissemination of informa-  
tion and so enabled, gradually,  
the man in the street, to learn  
and develop intellectual abili-  
ties, so will viewdata create a  
similar revolutionary change.

There is now clearly no lack of  
information around. Indeed, there  
is far too much of it; so  
much that the sheer labour of  
dealing with the increasing deluge  
of written material of all  
kinds, much of it irrelevant,  
often misleading, and frequently  
false, is so large that the task of  
reading, sifting and classifying is  
virtually impossible.

The individual is seldom able  
to find the information he  
wants, when he wants it, unlike  
the large organisations which  
have the help to sort out the  
essential information they  
require.

To the current information  
chaos which society has con-  
tributed to create, because of its  
avidity for information and  
knowledge but the lack of  
adequate means of control,  
viewdata brings order, structure  
and a ready means of retrieving  
the information one requires as  
the need arises.

Information is power; power  
to decide intelligently, to weigh  
alternatives with the relevant  
factors at hand; power to  
understand people's true  
motives; power to distinguish  
the true and the false; power to  
see and seize opportunities for a  
better life.

Clearly this facility of instant  
access to all the information  
that all people require will not be  
available immediately, perhaps  
never fully.

This new power will bring  
with it dangers and opportuni-  
ties.

There is the danger that view-  
data will be made the vehicle  
for information intended to de-  
ceive, to misinform or simply to  
be irrelevant, a convenience  
rather than a new tool for social  
development and advancement.

The opportunities, on the  
other hand, are great, but in  
their wake it is not inconceiv-  
able that substantial changes,  
perhaps even revolutionary  
changes, similar to those which  
resulted from the invention of  
the printing press, might well  
occur; changes which will re-  
store some balance to the dis-  
parity between the overwel-



SAM FEDIDA: A revolutionary  
change ...

...ing power of large organisa-  
tions and that of the individual.

What would be the result if,  
for example, at election time it  
were possible to examine the  
record of the various parties in-  
volved in the contest, the  
records of the individual candi-  
dates, how their opinions were  
matched to their actions, their  
antecedents, their political  
activities in the past and in other  
contexts, their involvement in  
important events and on  
important issues long since  
buried in the mass outpourings  
of the media?

It is a saying that the memory  
of the electorate is very short.  
The reason why this is true is  
because it is of the difficulties of  
documenting the mass of details  
that need to be marshalled to  
form an intelligent and well in-  
formed opinion.

With viewdata this need no  
longer be the same. The memory  
of the electorate could be as long  
as the community desires, when  
backed by relevant information,  
classified for easy retrieval, cas-  
ily accessible and within the  
financial means of all.

One major feature of the de-  
velopment of society in the  
second half of the twentieth  
century has been growing  
disparity between the power of  
the large organisation, and par-  
ticularly of the state apparatus,  
on the one hand and that of the  
individual on the other. Para-  
doxically, this has devel-  
oped in parallel with an  
apparent concern and care on  
the part of society for the disad-  
vantaged.

## Seminar on viewdata

Sam Fedida and journalist Rex  
Mellor are to give a seminar on  
the business opportunities and  
implications of viewdata in  
London on November 21 to 23.  
The fee is £285, but there is a  
£50 discount for booking, made  
before the end of September.  
For further information contact  
Viewdata Registrar, EDC Ltd, 2  
Dunston Terrace,  
SBJ (Tel 01-278 9517).

## Britain's First B.C.S.

HOME STUDY COURSE

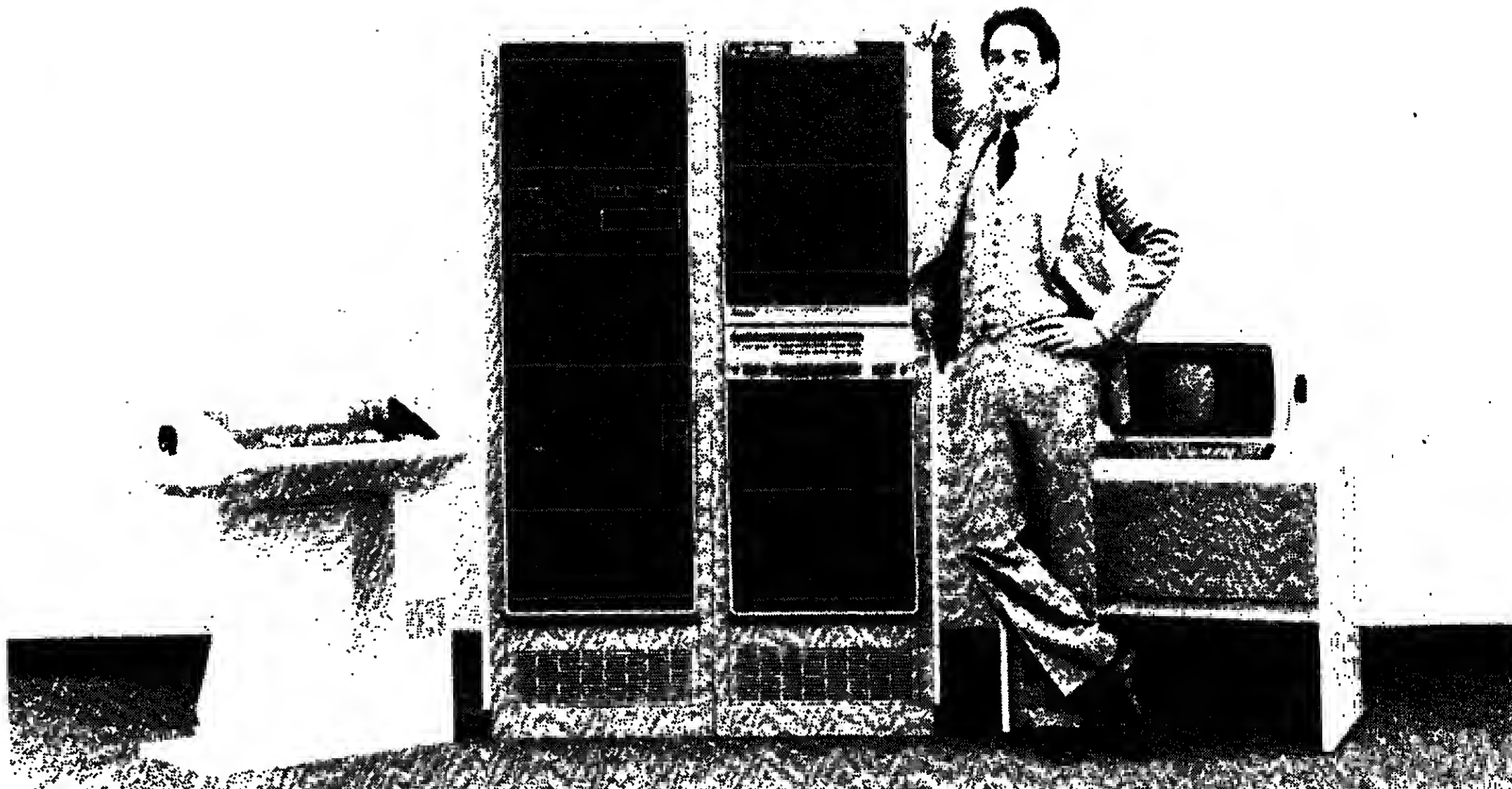
Now you can study for your Part 1 with a long-established  
Correspondence College that is already well known for its home-  
study courses (without expensive text books) in Accountancy  
Administration, Commerce, Law, Marketing Management and  
GCE. Written by specialists, the courses all carry a guarantee of  
continued tuition, and are designed to get you through your  
examination in the shortest possible time and at reasonable cost.

For full details please write to phone:

**THE RAPID RESULTS COLLEGE**

Dept. EV2, Tutition House, LONDON SW19 4BB

Tel 01-847 7272



# SOMEBODY HAS FINALLY DONE SOMETHING FOR THE MIDDLE CLASS. THE ECLIPSE S/130.

The ECLIPSE S/130 computer system proves it is still possible to make  
ends meet. Its performance, on the one hand, approaches that of our super  
high-speed ECLIPSE S/230. While its price is much closer to the level of our  
best-selling NOVA 3.

The ECLIPSE S/130 is built around the same powerful architecture  
as the ECLIPSE S/230. But it has its own unique character. Like our fast  
micro-coded floating point, efficient character string instruction set, our  
second-generation WCS micro-programming ability, as well as AOS, our  
heuristic multiprogramming advanced operating system.

All of which means that even  
though the ECLIPSE S/130 is in the  
middle of our family, it's in a class by  
itself when it comes to performance,  
features, and power for the money.  
And if you still think that value is a  
virtue, the ECLIPSE S/130 system  
won't let you down. For more  
information post the coupon.

Hounslow House, 724-734, London Road, Hounslow, Middlesex TW3 1PD.  
Tel: 01-572 7455. Telex: 935364

☐ Please send literature.  
☐ Please send literature and have a representative phone me.

Name \_\_\_\_\_

Position \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

**Data General**

The ECLIPSE S/130 System shown includes 128K bytes of memory, floating point instruction set, clock, "Dash" terminal printer and display, 10M byte disk drive, 315K byte diskette, and an applicable control, cabinet, and cabling. Licensed software available on this configuration are RDO, FORTRAN IV, optimizing FORTRAN IV, and BASIC.

01-572 7455



# MICHIE'S PRIVATEVIEW

## Such is the lure of simplicity



EARLIER Privateviews have mentioned information systems too complex to be comprehended (CW, January 19 and July 20). The human mind responds to complexity with simplifying slogans, at a cost to accuracy which varies from case to case. "When defending with king and queen" says the chess-master, "always keep king and rook together" and he does not err. But "With king and knight against king and rook, keep king and knight together" is sometimes wrong, and "After 1. P-K4... White's game is in its last throes" is not more than amusing — comparable perhaps to Nancy Mitford's Uncle Matthew on the wider game of life: "Abroad is bloody, and foreigners are fiends."

At no time are the mind's simplifications more active than when under stress of emotion. As a graduate student at Oxford I sat thunderstruck through an altercation at a crowded departmental seminar. Our Reader in Cytology John Baker, subsequently elevated to the Royal Society, was attacking the seminar speaker, none other than Dr J.B. Rhine.

Rhine was founder and

director of the Institute of Parapsychology at Duke University, North Carolina, later to be tarnished by the departure of its deputy-director caught in flagrant scientific fraud. But even at that early date Baker, a passionate scientific rationalist, felt that there was a rat to be smelt somewhere.

Grey-suited and manicured, Rhine suavely parried each thrust, scattering a largesse of cute remarks. So one might seek with parol and peanuts to deflect the mighty rhinoceros. John Baker, his voice a clarion, returned to the charge: "When Galileo dropped his balls from the leaning tower of Pisa..." It was enough. We had been stretched on the rack too long. I still hear the deafening shout of laughter as the hall exploded.

No-one, least of all the normally meticulous John Baker, noticed that he had it all wrong anyway. Galileo did not drop his, or anyone else's balls. He rolled cannon-balls down an inclined plane, Baker had momentarily simplified by confusing this with a weight-dropping demonstration made

earlier by the Dutch engineer Stevinus.

When simplifications reside in the phenomena themselves and can without cheating be conjured forth, there lies the gifted experimenter's greatness. Foucault's coup de theatre in 1851 with a pendulum strung from the ceiling of the Paris Pantheon was of this kind. Michael Pentz, Dean of Science at the Open University, has repeated it using the 268-foot high dome of St Paul's. A brass ball of 150 lb weight, set swinging in a 30-foot straight traverse, progressively knocks down a circle of sand on the floor. As the earth rotates beneath it, so the pendulum's swing, by insensible shifts, changes direction and in course of time would move through the complete 360°.

"Aha!" we say, "Of course!" and then "Beautiful!" Such is the lure of simplicity. But in pursuit of this lure, our minds are prepared to tell us the most extraordinary lies. Next Privateview will examine one of these, concerning the great astronomer-physicist Galileo.

## SOFTWARE FILE-1

### Altergo puts 'one-way flow' of technology from US into reverse

CRACKING the US treasure chest floating in a sea of IBM installations is the dream of many European software and services companies. But the path that lucrative goal is full of unexpected dangers and pitfalls, even though the end reward can be great.

Dave Brownlee, who was responsible for establishing the operations of Altergo Software in the US, is a man who has travelled that path and who can honestly admit that, although he made mistakes along the way, he now has no regrets as he sees the company beginning to reap the rewards of its US venture.

"When I first came to America early last year to start our US operations, I was over-optimistic about the speed we could grow nationwide," Brownlee recalled. "It is not possible to grow without having the right people to help you grow. As elsewhere in the computer business, talent in the US is in short supply."

It took seven months before Altergo recruited two technical staff to join Brownlee and his two British support staff. And it took longer to find the right sales people. "Since then we have grown through a kind of inner network, with new staff obtained mainly through personal contact."

Brownlee also emphasised two other crucial lessons learnt by Altergo.

"The costs of operation in the US can be phenomenal, so nobody should venture there without sufficient resources; and marketing and technical documentation must be of the highest quality."

Both these points relate directly or indirectly to one of the most important features of the US — its sheer geographical size.

Most phone calls are long distance and many client trips involve large air fares and hotel bills. So it is not practical to have the "bond holding" type of personal support which is common in Europe.

Brownlee said the telephone bill alone can be in the region of \$17,000 a month for Altergo. Because of the high expenses, he estimates that each manager costs about \$100,000 a year, each salesman about \$80,000 and each technical support person about \$70,000.

The geographical dispersion has been one of the main factors why the software package industry grew so quickly in the US. Software vendors had to find a way of offering software that could be implemented and maintained with relative ease, and could be as self-sufficient as possible.

Coupled with the lavish way in which the Americans were willing to upgrade hardware, an important side-effect of this has been, according to Brownlee, a trend in US package development towards a "checklist of bells and whistles" approach, rather than aiming at good efficiency and performance, which has been a priority for European software.

This led to important challenges to Altergo's main product, the Shadow II TP monitor for IBM systems. The need for well packaged software places a stress on documentation. "When we started in the US our documentation, which had been relatively well received in Europe, was only just adequate, at best, for the US market," said Brownlee.

"So we invested a great deal of resources in our first few months of operation in the US in improving documentation to a point which I believe makes it the best in the industry."

The American emphasis on the checklist approach to buying software meant that Shadow had to develop a wider range of user-oriented features to catch up with the "bells and whistles" offered by competitors.

But now that Shadow has extended its user checklist, Brownlee believes that the efficiency and design aspects of the product are beginning to get through to users, particularly as the slow growth of the US economy in recent years has begun to put European-style constraints on DP budgets.

As evidence of this acceptance, Brownlee claims that Shadow II is currently selling at a rate of ten a month in the US, which he believes is greater than any other independent supplier of TP monitors. The worldwide user base for Shadow is over 230, with about 90 in the US.

regional sales offices in the US with a total technical staff of over 20, mainly Americans, which Brownlee says will double when the right people are found.

Brownlee likes the frank, no-nonsense approach of the Americans. One of the "big differences" between the US and Europe he cites is the way in which a salesman will waste less time in making first calls on prospective users in the US.

"The US manager will answer frankly questions on the size of the budget and who in the organisation has the final buying power. In Europe, however, the manager often does not know the answer to questions of budget size and likes to pretend that he has the final say, even if he hasn't."

Brownlee points out that the inherently lower cost of software development in the UK means that Altergo Software can afford to have a bigger, higher quality development team based in Britain.

But he is very clearly in the mould of the American manager

lead by producing their own secure operating systems.

Subsequently, the Pentagon expected to be able to buy in systems commercially which would meet its security requirements.

These systems, he noted, could be implementations of KSDS on other hardware or

program verification techniques. The availability of a Euclid compiler would thus be of major assistance to the current project.

Ford, which is scheduled to deliver KSDS in September 1979, expects to receive the first version of the Euclid compiler from Toronto in about two months.

Also involved in the project is the Stamford Research Institute, which has been assigned 10 per cent of the work under subcontract. SRI's contribution is a range of automated theorem provers that can be used in the design verification step.

Frank Druding, director of software engineering at Ford Aerospace, noted that while it was hoped to use Euclid for the kernel, much of the remaining software would be written in the programming language C.

The completed system, he said, could well be portable to other machines, provided that they offered similar hardware protection mechanisms to the PDP-11.

However, neither the Pentagon nor Ford Aerospace regards Euclid as an indispensable tool for the development of provable software. Although work on the compiler is understood to be going very well, Concurrent Pascal could be used as the implementation language should the Euclid development be significantly delayed.

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."

An essential characteristic of kernel routines is that they are rigorously proven, using pro-

gram verification techniques.

could be other operating systems constructed using the same techniques. To facilitate such developments, the Pentagon intended to make KSDS design specifications and technical documentation widely available.

The concept of a kernelised operating system is based on the idea of an inviolable security kernel which supervises every data access. Generally assumed to be a small subset of a complete operating system, the kernel enforces security by acting as a "universal policeman."



## HINT OF THE WEEK

## Aligning stationery with sticky labels

THE alignment of pre-printed stationery on the ICL 1933 printer is the topic of a hint sent by David Leigh, an operator at the Manchester site of Covered Cables Ltd.

He says, "Quite often, the operator will spend a lot of time ensuring that the line-up of the stationery is correct."

"Vertical alignment is no problem, because on the left-hand side of the back-plate there is a series of numbers which act as reference points."

"However, horizontal alignment is a different matter, because there is no way of knowing whether the paper is too far to the left or right."

According to Leigh, this problem may be overcome by the use of sticky labels.

He continues, "You can save a lot of time and effort by putting a label on the backplate of the printer so that its top left-hand corner coincides with that of the form being aligned."

To get the label in the correct position, reverse the process just described — align the form by means of trial and error, and then attach the label to the backplate of the printer accordingly.

I would like to add another tip relating to the line-up of stationery: when the printer runs short of paper in the middle of producing a listing, simply overlap the first form of the new booklet with the one still on the carriage of the unit — this ensures that the alignment is right and covers a lot of time.

● A number of operators have expressed reluctance at submitting hints to Op Spot, because they believe that if they know certain "tricks of the trade" then everyone else will be as well-informed. This is not the case. From my own experience, and from talking to a number of contractors, it is clear that some sites are far more technically aware than others. And remember that the hints will be of considerable use to trainees.

## Coming out TOPS through Control Data

MANY persons looking to enter the field of computer operations (or any of the other computing disciplines, for that matter) have only a vague notion of what the work entails and the opportunities that are available.

They might well apply for jobs through the various agencies and, as a result of their keenness and lack of awareness, accept the first position offered to them.

However, there is an alternative method which gives budding operators a practical and theoretical training and the chance to visit two sites as part of their course.

This is the Manpower Service Commission's Training Opportunities Scheme (TOPS) which provides computing courses in

London and throughout the rest of the country.

The MSC comprises an employment services division and training services division; the former, with its job centres and employment offices, is responsible for attracting potential students; and the latter arranges for courses to be run by colleges and companies.

One such company is Control Data Institute, which provides TOPS courses for operators at its training centres in Birmingham, Manchester, Leeds and London. New centres are to be opened at Bristol and Nottingham during September and October respectively.

The CDI operator course is for persons between the age of 19 and 28 years. Their purpose is

to train the students to the level of junior operator with a view to placing them with companies.

The candidates go through a stringent selection process: they attempt a written test and, if successful, go on to an interview. A pretty low percentage actually get through both stages.

"The written selection tests are not to see what aptitudes they have, but to find out whether they have the natural skills necessary to cope with the training. Of those who come along, about 23% actually get through this stage," said Michael O'Connor, sales and services manager at CDI.

The interview is equally strict, as he explained: "During the interview we look to see if they have personality and motivation necessary to make a good operator or programmer."

Whether they are sent on the programming or operations course depends upon personality, and not how well they have done in the written test. "It works out that about nine out of every 100 actually get through both stages of the selection."

According to O'Connor, CDI has had a considerable rate of success since it started holding TOPS courses at the end of 1976.

"Between January of last year and July of this, about 180 of our students successfully completed the operations course and have been placed with companies as junior operators," he said.

From 17 who graduated from a course at the Manchester centre on May 29, 15 were placed with firms within six weeks. Of the two not working as operators, O'Connor said, "One is in hospital and the other went off to Holland, I think."

The record of a course at the Birmingham centre is even better, according to O'Connor. "That course, which was completed on July 31, had a 100% pass rate. They have all since been employed by companies."

CDI plans to modify the operations course so that the students are given more individual tuition, as opposed to being considered part of a group.

"At the end of the year, we are to reduce the number we take in every six weeks from between 15 and 20, to 10. This will enable us to follow each individual's progress more closely," said O'Connor.

Despite this, the content of the operations course is to

remain the same. It includes an appreciation of general IS topics; training in both IBM and ICL hardware and software; two periods (both two weeks long) when the students attend an ICL and an IBM site in order to work as part of an operating team.

These site visits fit in with the rest of the course in a logical manner; after they have studied the ICL hardware and software, they go to a site using the equipment. The same applies to the IBM section.

According to Chris Thorne, who is regional instructional manager for the CDI centre outside London, the practical side of the training is extremely valuable in placing students when they finish the course.

He said, "The site visits provide an excellent opportunity for the student and the company concerned to take a good look at each other and to see if they are suitable."

But even if the student has the opportunity to join the company as soon as he has completed his visit, CDI still advises him to complete the course.

Said Thorne, "We would encourage anyone to drop out of the course at that point. For example, after the two-week period at the ICL installation comes the training on IBM equipment, which intensifies the period at the ICL installation."

He then went on to describe the usual way in which CDI finds jobs for its students.

"Each regional office has training services officers who are responsible for recruiting students and finding them positions with companies. He works closely with the training instructor and together they study each student's progress, strengths and weaknesses."

"Of course, the training services officer is in direct contact with the companies, and so he knows exactly the sort of person each one is looking for."

He continued, "The companies get an excellent deal because the whole thing doesn't cost them a penny." In addition to this, they are able to see how the student has performed on the course.

Thorne concluded, "Each student has a report card which is shown to the prospective employer. Recorded on it are the student's marks on each topic covered and the remarks of the lecturer concerned."

Operators often complain that nobody listens to their point of view. Well, Op Spot is listening and Bernard Allen would like to hear your opinions and ideas on all matters relating to computer operations. Your letters should be sent to Op Spot, Computer Weekly, Dorset House, Stomford Street, London SE1 8LU. Telephone calls are equally welcome and Bernard can be contacted directly on 01-261 8035.

Have you the skills to be an Operations Manager at £10,000 p.a.

If not, make sure you get them through Infotech Operations Training.

call Phil Cartmell for details: 0628-35031

Infotech Operations Ltd.

Michelson House, Maidenhead, Berkshire, England. Telephone: 0628-35031. Telex: 54121.

By Bernard Allen

## Pilot and computer link-up for fail-safe flying

THE complexity of modern fighter aircraft is so high that it will shortly become impossible for pilots to fly them without substantial support from computer and associated electronic equipment.

The problem, however, is to find the best method of transferring data at high speeds into a pilot's brain and checking that all parts of the message have been recognised.

Highlighting research he has done on this problem, Carl Sem-Jacobsen, of the EEG Research Institute in Oslo, gave a talk on brain/computer communication at the International Congress of Aerospace Medicine last week.

"Information about man's ability to adapt to changing environments and

data on his requirements in such situations is of paramount importance for present day and future aviation and space travel," he said.

Sem-Jacobsen has been carrying out tests on US Air Force pilots since 1958, and his studies have concentrated on the change in brain waves that signify that a particular piece of information has been received and understood; referred to as an "evoked response." Recording of these changes is achieved by attaching electrodes to pilots' scalps and using a computer to process the resulting data.

A scenario for the cockpit of the future, he suggests, is that all instruments will be replaced by a VDU screen. The on-board computer would then be able to flash

information to the pilot via this or provide it aurally by means of coded signals.

"This information will be given either on the request of the pilot or when information monitored by the computer reaches a threshold point, and the pilot should be alerted," said Sem-Jacobsen.

Safeguards would have to be built in so that if the pilot did not take full account of the data, the system would inhibit him from making a wrong and possibly catastrophic decision.

"An example could be like this," added Sem-Jacobsen. "The computer gives the pilot 10 different sets of information in sequence, but the busy pilot overlooks four of them. When the pilot wants to take action on the basis of only six sets,

the computer will freeze the controls and flash something like — reconsider, you did not take into consideration these four sets of information which must be considered. The computer then repeats the four unrecognised sets."

Currently, Sem-Jacobsen is conducting similar experiments with North Sea divers who operate submersibles.

"I have used a microprocessor-based system to record and process details of divers' brain wave activity while they carry out work in the North Sea," he said. "Electrodes are attached to their scalps as with the pilots and information is relayed to the surface via a special cable in the submersible's umbilical."

## Motorola launches three-chip CMOS-based codec set

An all-CMOS codec set has been introduced by Motorola to win a share of the booming telecommunications market. A codec encodes and decodes audio signals for digital transmission.

The three-chip set consists of a companding codec chip which is available now, backed by a filter chip and a linear device that replaces the hybrid transformer normally required in another analogue to digital conversion equipment. The last two will be available early next year. This codec set is the first to use the CMOS approach. CMOS offers considerable advantages in terms of power consumption and power supply tolerance which could be important in some telecommunications applications.

## HAMILTON RENTALS

Monthly Rentals (ex. VAT)

Purchase Price	3 Months Hire	6 Months Hire	12 Months Hire
TYPEWRITERS AND WORD PROCESSORS			
IBM 802	47	36	31
IBM 803	47	36	31
IBM 804	47	36	31
IBM 805	47	36	31
IBM 806	47	36	31
IBM 807	47	36	31
IBM 808	47	36	31
IBM 809	47	36	31
IBM 810	47	36	31
IBM 811	47	36	31
IBM 812	47	36	31
IBM 813	47	36	31
IBM 814	47	36	31
IBM 815	47	36	31
IBM 816	47	36	31
IBM 817	47	36	31
IBM 818	47	36	31
IBM 819	47	36	31
IBM 820	47	36	31
IBM 821	47	36	31
IBM 822	47	36	31
IBM 823	47	36	31
IBM 824	47	36	31
IBM 825	47	36	31
IBM 826	47	36	31
IBM 827	47	36	31
IBM 828	47	36	31
IBM 829	47	36	31
IBM 830	47	36	31
IBM 831	47	36	31
IBM 832	47	36	31
IBM 833	47	36	31
IBM 834	47	36	31
IBM 835	47	36	31
IBM 836	47	36	31
IBM 837	47	36	31
IBM 838	47	36	31
IBM 839	47	36	31
IBM 840	47	36	31
IBM 841	47	36	31
IBM 842	47	36	31
IBM 843	47	36	31
IBM 844	47	36	31
IBM 845	47	36	31
IBM 846	47	36	31
IBM 847	47	36	31
IBM 848	47	36	31
IBM 849	47	36	31
IBM 850	47	36	31
IBM 851	47	36	31
IBM 852	47	36	31
IBM 853	47	36	31
IBM 854	47	36	31
IBM 855	47	36	31
IBM 856	47	36	31
IBM 857	47	36	31
IBM 858	47	36	31
IBM 859	47	36	31
IBM 860	47	36	31
IBM 861	47	36	31
IBM 862	47	36	31
IBM 863	47	36	31
IBM 864	47	36	31
IBM 865	47	36	31
IBM 866	47	36	31
IBM 867	47	36	31
IBM 868	47	36	31
IBM 869	47	36	31
IBM 870	47	36	31
IBM 871	47	36	31
IBM 872	47	36	31
IBM 873	47	36	31
IBM 874	47	36	31
IBM 875	47	36	31
IBM 876	47	36	31
IBM 877	47	36	31
IBM 878	47	36	31
IBM 879	47	36	31
IBM 880	47	36	31
IBM 881	47	36	31
IBM 882	47	36	31
IBM 883	47	36	31
IBM 884	47	36	31
IBM 885	47	36	31
IBM 886	47	36	31
IBM 887	47	36	31
IBM 888	47	36	31
IBM 889	47	36	31
IBM 890	47	36	31
IBM 891	47	36	31
IBM 892	47	36	31
IBM 893	47	36	31
IBM 894	47	36	31
IBM 895	47	36	31
IBM 896	47	36	31
IBM 897	47	36	31
IBM 898	47	36	31
IBM 899	47	36	31
IBM 900	47	36	31
IBM 901	47	36	31
IBM 902	47	36	31
IBM 903	47	36	31
IBM 904	47	36	31
IBM 905	47	36	31
IBM 906	47	36	31
IBM 907	47	36	31
IBM 908	47	36	31
IBM 909	47	36	31
IBM 910	47	36	31
IBM 911	47	36	31
IBM 912	47	36	31
IBM 913	47	36	31
IBM 914	47	36	31
IBM 915	47	36	31
IBM 916	47	36	31
IBM 917	47	36	31
IBM 918	47	36	31
IBM 919	47	36	31
IBM 920	47	36	31
IBM 921	47	36	31
IBM 922	47	36	31
IBM 923	47	36	31
IBM 924	47	36	31
IBM 925	47	36	31
IBM 926	47	36	31
IBM 927	47	36	31
IBM 928	47	36	31
IBM 929	47	36	31
IBM 930	47	36	31
IBM 931	47	36	31
IBM 932	47	36	31
IBM 933	47	36	31
IBM 934	47	36	31
IBM 935	47	36	31
IBM 936	47	36	31
IBM 937	47	36	31
IBM 938	47	36	31
IBM 939	47	36	31
IBM 940	47	36	31
IBM 941	47	36	31
IBM 942	47	36	31
IBM 943	47	36	31
IBM 944	47	36	31
IBM 945	47	36	31
IBM 946	47	36	31
IBM 947	47	36	31
IBM 948	47	36	31
IBM 949	47	36	31
IBM 950	47	36	31
IBM 951	47	36	31
IBM 952	47	36	31
IBM 953	47	36	31
IBM 954	47	36	31
IBM 955	47	36	31
IBM 956	47	36	31
IBM 957	47	36	31
IBM 958	47	36	31
IBM 959	47	36	31
IBM 960	47	36	31
IBM 961	47	36	31
IBM 962	47	36	31
IBM 963	47	36	31
IBM 964	47	36	31
IBM 965	47	36	31
IBM 966	47	36	31
IBM 967	47	36	31
IBM 968	47	36	31
IBM 969	47	36	31
IBM 970	47	36	31
IBM 971	47	36	31
IBM 972	47	36	31
IBM 973	47	36	31
IBM 974	47	36	31
IBM 975	47	36	31
IBM 976	47	36	31
IBM 977	47	36	31
IBM 978	47	36	31
IBM 979	47	36	31
IBM 980	47	36	31
IBM 981	47	36	31
IBM 982	47	36	31
IBM 983	47	36	31
IBM 984	47	36	31
IBM 985	47	36	31
IBM 986	47	36	31
IBM 987	47	36	31
IBM 988	47	36	31
IBM 989	47	36	31
IBM 990	47	36	31
IBM 991	47	36	31
IBM 992	47	36	31
IBM 993	47	36	31
IBM 994	47	36	31
IBM 995	47	36	31
IBM 996	47	36	31
IBM 997	47	36	31
IBM 998	47	36	31
IBM 999	47	36	31
IBM 1000	47	36	31

## DIGITAL WORD PROCESSOR





## Management game chief

THE newly elected chairman of the members' regional committee of the National Computing Centre is Brian Byers, ICL's Northern Ireland manager. Byers (left) was congratulated on his appointment by Aileen

man D. Cooke, Lord Mayor of Belfast, at the finale of the Irish Management Game.

The Irish Management Game is sponsored by four companies including ICL.

## Control Data appoints three more to the board

THREE new appointments to the board of directors have been announced by Control Data. One is Richard Anderson, UK finance and administration manager. Previously financial controller, he joined the company in 75. Another is Alan Gill, he is plant manager of the magnetic media manufacturing division of Control Data, based in Brynmawr.

Jenson Computer Systems of Bristol has taken on three young people in trainee/junior positions. Richard Gregory, who was doing statistical work as a programmer with the Cardiff Health Authority, has joined the company as a junior programmer. He is on a two-year sub-study from his degree course in Applied Science at the New South Wales Institute of Technology, Australia.

Jerry Locke has also joined Jenson as a trainee programmer. He was studying for his BA in systems analysis at the Bristol Polytechnic. Also to join the company as a junior programmer is Mohammed Shariff. He has an HND in computer studies from Derby College of Technology.

South Wales, Gill joined the company in 77. The third one is Mike McLagan, he joined the company in 70 and is managing director of Control Data's Leichworth-based business products division of Control Data. Before joining Control Data in UK, McLagan has previously spent 11 years with the company in Canada.

Stu Peters has been appointed by Teradyne, a company which manufactures test equipment for electronic components, as director of European Operations, based at Weybridge, Surrey. Since 73, he has been director of Far East Operations of the company's Tokyo-based Japanese subsidiary.

Stephen Stewart and Renal Wynn have been appointed to the board of directors of Data and Research Services, of Milton Keynes. They have been with the company since 72 and 75 respectively. While one vacancy was created by the departure of the US company Westinghouse as a shareholder in DRS, the other vacancy was created by the death of Professor Lindquist, one of the founders of the company.



IT Business Systems UK has made three senior appointments, all from within the group. John King, who was marketing director, has been posted to Brussels as European director of business and market development of the IT Business Systems and Communications Group. Succeeding him as marketing director is Peter Parry, who has been marketing manager of the group since 77. The third appointment is that of Geoffrey Meadows, formerly general sales manager since 77, he moves to become head of the group's Data Systems Division, at Cuckfield.

Bob Smith, appointed marketing manager at Software Development Services, was previously Western district customer engineering manager at Hewlett Packard.

Michael James, who was previously with Digital Equipment Corp. Reading has joined Peter International, Reading, part of the Perce Computer Corp. to operate its inside sales support. Also to join the company is Ronald Rogers, as training instructor. He was previously with EMI (Mushart, Slough) as engineering training officer.

## DIARY

SEPTEMBER 18-22

London design technique workshop. Marcus Thompson, Dept of Computer Science, University of Strathclyde, Glasgow, Scotland, from the 1st continuing Education Office at the University, tel 01224 4000, ext 2132.

SEPTEMBER 19

Testing and control expert, seminar Association of Project Managers, Association of End Engineers, Holts Road, Manchester, Details M H Parker, 061 274 2011.

Performance evaluation, Prof P. Samuel, BCS, Reading branch, Copper Inn, Pangbourne, 20.00.

SEPTEMBER 18-21

IBM C/AL computer aided design and manufacturing conference and exhibition. Computer and Automated Systems Association, Los Angeles.

SEPTEMBER 20

UK/UK subgroup meeting, 2900 User Group, National Liberal Club, London SW1, 10.00.

Micro software, Dick Waller, HPMA Essex branch, County Hotel, Rainford Road, Chelmsford, 20.00.

SEPTEMBER 21-23

Local Authorities Group meeting, IBM Computer Users' Association, Central Regional Council, Stirling, Details Mrs. Speckle, 01 551 1043.

SEPTEMBER 21

Telecommunications - convergence of technologies, Derek Thompson, D'S Cup, 10.00, Walsley Hotel, Aldwyck, London WC2, 10.00.

SEPTEMBER 18-22

London design technique workshop. Marcus Thompson, Dept of Computer Science, University of Strathclyde, Glasgow, Scotland, from the 1st continuing Education Office at the University, tel 01224 4000, ext 2132.

SEPTEMBER 19

Testing and control expert, seminar Association of Project Managers, Association of End Engineers, Holts Road, Manchester, Details M H Parker, 061 274 2011.

Performance evaluation, Prof P. Samuel, BCS, Reading branch, Copper Inn, Pangbourne, 20.00.

SEPTEMBER 18-21

IBM C/AL computer aided design and manufacturing conference and exhibition. Computer and Automated Systems Association, Los Angeles.

SEPTEMBER 20

UK/UK subgroup meeting, 2900 User Group, National Liberal Club, London SW1, 10.00.

Micro software, Dick Waller, HPMA Essex branch, County Hotel, Rainford Road, Chelmsford, 20.00.

SEPTEMBER 21-23

Local Authorities Group meeting, IBM Computer Users' Association, Central Regional Council, Stirling, Details Mrs. Speckle, 01 551 1043.

SEPTEMBER 21

Telecommunications - convergence of technologies, Derek Thompson, D'S Cup, 10.00, Walsley Hotel, Aldwyck, London WC2, 10.00.

# Inmos reaction to 64K RAM from TI

THE announcement of a 64K dynamic RAM by Texas Instruments last week does not mean that the UK's Inmos has missed the boat, even though the National Enterprise Board-backed firm is unlikely to have such a device on the market before 1981. This is the view of Inmos deputy managing director, Dr Paul Schroeder, who pointed out that the 4K and 16K devices developed by his former employer, Mostek, were both late in the field but still became industry standards.

## Silent 700 beats big drum for North-east

THE job of attracting new industry to the North-east of England has been simplified by the use of a system called Competer, which has been developed and is used by the Peterlee Development Corporation.

PDC officers now carry a portable Texas Instruments Silent 700 terminal whenever they go overseas to meet industrialists interested in locating a factory in Peterlee.

The terminal can be connected in any office telephone in any country and answer industrialists' questions about the incentives his project will attract, an assessment of his project's long-term viability, information on his ideal location and a range of up-to-date figures on employee and factory availability.

The worldwide capability of the system is made possible by using the Comshare time sharing network.

"The program was not easy to draw up," said Fred McElenaghan, PDC's assistant director for industry. "It involves many variables, but the Peterlee industrial team is now operating it very smoothly and we have drawn up a number of additional programs to develop the system further as a sales aid."

Previously, only general examples or incomplete answers could be given.

"Already, a number of industrialists visiting us have had Computer demonstrations to them on their own individual projects," added McElenaghan, "and they have been very impressed."

## Tanzanian order

TANZANIA'S Posts and Telecommunications Administration has ordered a computer-controlled telex switching system from Fujitsu.

The Fedex-100 system is due to be in operation in Dar-es-Salaam by March 1980 with 1,100 exchange lines, and the £235,000 contract includes equipment, installation, maintenance and employee training.

## Turnkey systems for news wholesalers

USING experience gained in developing and operating its Newspace bureau service, Gamma Associates, the Nottingham-based systems group has introduced News-Key, a range of turnkey systems for wholesale newsgroups.

Gamma also announced that the first order for a News-Key machine, a News-Key 1, has been placed by W. Knight of Northampton.

Based on Digital Equipment Corporation hardware, News-Key comes in three basic models, all of which can be tailored to individual user's requirements.

About four years ago, Gamma added its Newspace system to its range of services and now has 14 wholesale newsgroups subscribing to it.

However, it was felt that there

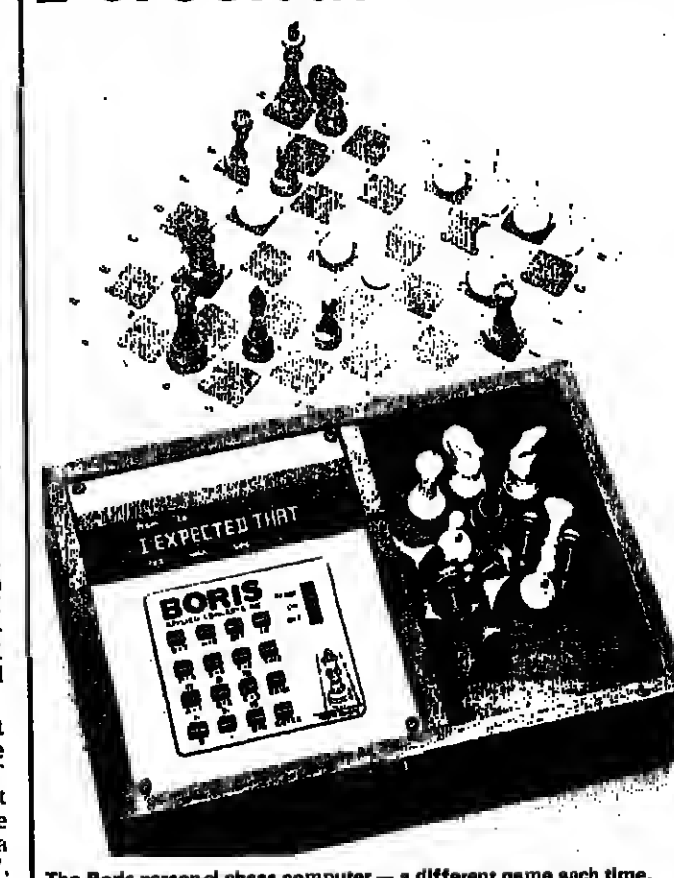
## Information systems user group

AT last there is an opportunity for online users in the North West to get together without the expense of a London trip. A Manchester user group has now been formed for new and potential users of International Information Systems.

The main aim is for users to meet to exchange information and experience, although speakers and visits will also be included in the program. The first meeting is on September 20 in Room 93 of the Media and Social Science Building, UNIST, Sackville Street, Manchester.

Experienced users from ICL and Unilever will discuss the pros and cons of the different systems as a prelude to a general discussion on the use of online systems. A full program has been arranged into 1978. Contact the secretary, Mrs. Ringel, Medical School Library, Manchester University or the chairman, Dr P. W. Williams, Computation Dept, UNIST, PO Box 99, Manchester M60 1QD.

## Personal chess move...



International marketing rights for a personal chess computer called Boris have been awarded to the Washington Executive Group in Washington DC.

Produced by Chofitz, of Rockville, Maryland, Boris is based on the Fairchild F8 microprocessor and is programmed for all classic chess moves, including costing, en passant, and queening. It is also programmed for random play, so that the beginner or experienced player will not get the same game twice.

Boris is portable and comes in a walnut case (25 x 8 x 18cm), which encloses a compact chess board and a set of chess pieces, but the player can use his own board and pieces.

Alphanumeric messages are displayed to signify moves or tell the user which colour Boris will play. It can also display chat messages.

The cost of the system in the US is \$300, but it is likely to sell for £199 in the UK. It will be available from normal retail outlets. The UK distribution agent is Optimisation, of Bishop's Stortford.

The Boris personal chess computer — a different game each time.

# DIALOGUE WITH ZILOG

One day conventions, organised by Cramer Microsystems especially for software houses, systems analysts and consultants.

London (The Royal Academy of Film and TV Arts, Piccadilly) 10th October  
Manchester (The Playboy Club, Canal Street) 12th October  
Top level speakers from Zilog and Cramer.

## Programme

(REGISTRATION AND COFFEE AT 09.30)

(LUNCH)

### 1. Zilog — computing for the '80's

How systems designers can keep a generation ahead: an explanation of Zilog's philosophy of concentrating on software, system design, computer architecture and LSI technology.

Pepe Piedra (European Marketing Director of Zilog)

### 2. Products to solve systems problems

Current and new products, including cartridge discs, drives and integrated intelligent terminals to suit a variety of packaging requirements.

John Lythall and Jim Coupland (Cramer Microsystems) and Peter Beckett (European Technical Manager, Zilog)

### 3. Software tools for the company that knows the software business

Peter Beckett (Zilog), John Lythall (Cramer)

Micros that give you a choice of four software families: COBOL, extended BASIC, FORTRAN and PLZ

(TEA)

### 4. Software applications

Packages developed for commercial use.

Steve Kirk (Software Architects Ltd)

### 5. Question Time

- \* Hardware exhibition
- \* Complete package of literature
- \* Entrance fee £25 (inc. lunch, tea and VAT)

## BOOK NOW TO MAKE SURE YOU KEEP A GENERATION AHEAD

Please send me \_\_\_\_\_ ticket(s) for Dialogue with Zilog in London ☐ Manchester ☐

I enclose cheque ☐ postal order ☐ Please invoice my company ☐

Name \_\_\_\_\_ Company address \_\_\_\_\_

Reply to Jean Sweeney, Cramer Electronics, Cramer Components, Limited, Hawke House, Green Street, Sunbury-on-Thames, Middlesex. Tel: 01-879 7780.

**cramer MICROSYSTEMS**

THIS INNOVATION OF YOURS... IT'S NO GOOD...

...I GRANT YOU IT! WORK — I'LL ADMIT IT COULD SAVE TIME AND MONEY...

BUT THERE IS ONE FATAL FLAW — IF WE USED IT...

...IT WOULD BE A PRECEDENT...

## It doesn't take a computer to come up with the answer.

We don't make mainframes at ITT.

Using over half a century's experience in telecommunications, we make the means of talking with them.

A highly sophisticated range of peripherals, with the competitive prices and service facilities that only a big company can offer.

We also produce private switchboards and message switching systems, many of them built around micro-processors.

You can rent, lease or buy directly from us. And for all our equipment we have nationwide customer servicing with experts in every field.

They're very fast — and seldom necessary.

Get in touch with our Sales Information Department soon — there's still a whole lot more you should know.

It'll soon convince you of where the answer lies.

Sales Information Department, Hollingbury, Brighton BN1 8AN. 0273-507111.

**ITT Business Systems ITT**







COMPOTER WEEKLY, September 7, 1978

**market place**

FOR SALE

Advertising Rates

PHONE 01-261 8757

### WANTED!

**IBM 3963**

Switching Unit Reg.

Box 19

A-1197 Wian

Telex 07-6272

### FOR SALE

113M Peripheral Industry 330/11

2821/2 + 1403/No. 1

2303/1 + 2 11mas 2401-2

Also ICL 2813 EOS 30

Disc's ICL 72 Printer Pancher

Koda VP VIP Pancher

to purchase IBM 370 130

IBM 370/135, 512K

IBM 370/125, 255K

We also require peripherals

**RELIANCE**

**COMPUTER**

**GROUP LTD.**

79 Commonfields, Sheffield

Tel: 0742 666251

### PDP8 SYSTEMS FOR SALE

SURPLUS TO REQUIREMENTS

4K PDP8/E, TELETYPE

FAST PAPER TAPE READER/PUNCH ..... £2,000

4K PDP8/E, TELETYPE

FAST PAPER TAPE READER ..... £1,750

BOTH SYSTEMS MAINTAINED UNDER DEC CONTRACTS AND IN DAILY USE.

APPLY TO:

County Supplies Officer, Commercial Road, Reading

or

Director of Education (for the attention of Mr. Kanyon)

Kannat House, 8D-82 King's Road, Reading

### COMPUTER WANTED

Interested in purchasing an IBM 32, System Unit 120 CPS BI 5.0 MB (220v 50 cycles) — or similar type of machine.

Kindly contact Mrs. F. Tobler, Tel. (022) 28 67 66, Telex: 23 994 or write to: F.P.C.A., International Division, 6 rue de Riva, 1204 Geneva — CH.

### COMPUTER FINANCING

Specialists in new and used IBM Computers

**Cf**

STANBROOK HOUSE, 2-5 OLD BOND STREET, LONDON W1N 3TB

Telephone: 01-491 4134 & 01-491 7935, Telex: 268045

**DEC 11/70**

**COMPLETE SYSTEMS**

**AT SUPERB PRICES!**

**FROM SYSTEK**

22 NEWMAN STREET

LONDON W1P 3HB

01-628 3026/637 9686

TELEX YOUR SPEC: 261960

MARYLEBONE, W.1

Furnished Flat

1 bed./living room

plus kitchen and bath.

Sleep 1/2. Phone.

6-month let. £200 per

month inclusive. Suit

computer professional.

01-486 6644

### FOR SALE

IBM 029's, 059's,

P129's

Sorter/interpreters

Wanted used disc

packs and any other

used equipments

Tel: 01-622 7545

### LETTERS TO THE EDITOR

## Computers 'not nearly independent enough'

THE virtues of a free, uncensored Press, with access by all shades of opinion, are well illustrated by the issue of August 31. I refer to the differing views on human-like aspects of computers, and their effect on the future of mankind, from Donald Michie and Christopher Hodder-Williams.

### Plea for a more human face

INSOFAR as I understand "Cognitive Horizons" (Michie's Privatesview, August 31) it appeared to be some kind of plea to give computing a more human face in the eyes of the public.

I say "Insofar as I understand" because the article contained many of the awful lumps of mind-numbing jargon which computer people — along with sociologists — feel they have to use in order to impress people.

Receptor and effector organs... Mega-systems heuristic and inference procedures... Conceptual interface between man and machines...

May I suggest that it would help to give computing a more human face if people like Michie would stop talking like machines and used a more human language?

Such as English?

S. KEERY

Garnet, Herts.

### KPG sets up firm in States

THE major market potential of the Solitaire small business system in the US has led systems and software house KPG to set up a US subsidiary in Georgia. KPG Inc is at the same time negotiating with several US manufacturers with a view to implementing its software on their systems.

David Turnbull, head of the US operation, said that Solitaire represented at the moment a unique offering in the American market-place, combining a wide range of end-user oriented application packages on a low-cost business microcomputer. The system was also suitable, he added, for supporting both word-processing and commercial data processing in a single set of hardware.

Packages being converted by the company for the US included a retail stores system and billing systems for legal and dental practices. The company could also offer Solitaire accounting packages to US standards, he said.

Developed, according to the company, at a six-figure cost over the last two years, the Solitaire is based on three Intel 8080s (CW, November 24, 1977) and also uses Intel equipment. A system including a Diablo printer and half-megabyte of floppy disc sells in the UK for under £10,000 and would be sold in the US for around \$16,000.

A key feature of the system, of which more than 20 have sold in the UK, is a specially developed stand-alone Basic interpreter and operating system.

### Call for papers

A CALL for papers for Specifications of Reliable Software, a conference to be held on April 3-6, 1979 in Cambridge, Massachusetts, has been issued by the organisers, the Technical Committee on Software Engineering of the IEEE Computer Society. Deadline for submission of papers is November 1. Details from Marvin Zelkowitz, Dept. of Computer Science, University of Maryland, College Park, MD 20742, Tel: (301) 484-1261.

Professor Michie is afraid of computers getting too smart, able and will hence make mankind irrelevant, whereas Mr Hodder-Williams thinks that human-like computers will take over just because they are human-like. Unintentionally, Mr Hodder-Williams has a point. In evolutionary theory, which is not restricted to biochemical beings, two competing organisms cannot occupy the same ecological niche for any length of time; hence in the intellectual environment, sufficiently human-like computers will either displace mankind, or the other, or adapt — in uncertainly? But Mr Hodder-Williams is surely being a bit alarmist — computers are just not nearly independent enough, nor will be for a long time, for this to matter.

On a more practical level, one wonders what we need human-like computers for: we have a billion already and they work on hardly all he fed properly as it is. To err is human; we need something different to help us.

Professor Michie also has a point when he says that unhuman-like computers will have goals not ours. Perhaps a partial solution can be found by building in something like

Haywards Heath, Sussex.

The Editor welcomes letters, subjects published in Computer Weekly, or on original topics. All letters must be accompanied by the writer's name and address, not necessarily to be published. All letters are subject to cut at the discretion of the Editor, unless correspondence that their letters may not be

### TIM PALMER REPORTS FROM NEWCASTLE ON THE IBM SEMINAR

## Need to retrain systems designers to meet demands of trade unions

OVER the next few years, a major retraining of computer systems designers will be needed to meet the growing demands of trade unions that their members be involved at all stages of design and implementation of new computer systems.

So says Professor K. Nygaard, of the Norwegian Computing Centre, who has been closely involved with the Norwegian Federation of Trades Unions on the formulation of an agreement with national employers' federation on the introduction of computer-based systems.

Professor Nygaard was speaking last week at the Joint International Seminar on the Teaching of Computer Science, sponsored by IBM and held annually at Newcastle University.

He is the creator of the Simula simulation language, and first became involved with the unions in the mid-1960s.

"I found they were using Simula in a completely one-sided way, and rather than reinvent Simula, I decided to work with them," he said.

The Norwegian agreement was signed in 1975, and its key clauses cover the right of employees to be fully informed, in non-specialist language, of plans to introduce computer technology as soon as the first

decision has been taken, and before systems design has begun.

An important clause says that employees likely to have their work methods and responsibilities affected by new systems should be involved as much as possible in the project work, so that their knowledge and experience can be used; employees should influence the development, introduction and methods of use of the system.

"As a result of the agreement, 'data' shop stewards have been appointed through whom companies consult the workforce, and the agreement was followed in 1977 by legislation on job protection and the working environment," said Professor Nygaard. The law states that employees and their representatives must be informed of plans to develop computer systems, and should take part in the systems planning process.

Similar legislation is planned in Sweden and Denmark, and Professor Nygaard believes that it is no more than five or six years away in the UK.

"We need far better tools for describing the systems we plan to develop, tools which make it easy to take the parts of the system which are computer based and write the necessary program. Very non-trivial extensions to our existing tools will have to be made, and I believe that in the future we will have to develop a large number of different profession-oriented languages," he said.

Professor Nygaard saw the growth of distributed processing making the problem much more acute, since computers were now affecting the working conditions of far more people.

"Many people now see the computer version of an event through a display, rather than the real thing. We just do not know what effect this is going to have, and little study is being done. Systems are both fly-by-wire, and job-oriented, where the individual job is a cross-section of the flow, but the designer typically sees only the flow, and the employee sees only the job."

"Workers must be shown both the flow and the job orientation, and trade unions therefore have a direct interest in good programming languages. People will have to work, communicate and interact in a different way, and systems design will have to be a team effort, with the computer scientist just one member of the team."

Professor Nygaard foresees problems for designers and a large number of personal

### Generating a little heat

A SUGGESTION from Mrs Gill Ringland that it did not matter much what language computer science students were first taught, and that Babel was fine, provoked howls of anguish from the delegates at the Newcastle seminar.

Mrs Ringland gave a status report on the Science Research Council's Co-ordinated Research Programme in Distributed Computing, for which she is industrial co-ordinator, and clearly enjoyed stirring up a little heated debate.

Professor Page of Newcastle questioned selection of a specific topic for co-ordinated research, saying that it generated demand and could be a recipe for disaster.

Professor Heath of Harlow, Wilt, celebrated for his work on directed graph methods, complained that he had heard very little about the Data Flow project at Manchester, yet it appeared to be a directed graph system under another name.

Professor Neuhold of Stuttgart commented that almost all the SRC projects seemed to use US minds. "In Germany life is very difficult to get a non-German computer for research," he said.

### New insights into design of operating systems

A LOCAL area computer network at Cambridge University is providing new insights into the design and working of operating systems.

Very little work has been done on measuring the internal data rates of computers, but the data rates in a local area ring network are very comparable with those obtaining within a computer running under a real-time purpose operating system.

Dr Roger Needham, of the Cambridge Computer Laboratory, told the Newcastle seminar.

This means that you can split the functions of an operating system, and make the normally internal data flows external on the ring. The ring at Cambridge

consists of two twisted pairs of wires with a 10 Megabit data rate; there are currently five minicomputers attached to the ring, and a repeater every 100 to 200 metres. There is currently one simple device — a graph plotter while happened to be surplus to requirements — attached to the ring, and a line printer is to be added shortly.

The approach to adding low-level devices will be to attach a "station" capable of supporting any device at each repeater. "Ideally, the station should consist of no more than two chips."

He recommended late binding of the addresses of services offered on the network, and that services should be looked up by name rather than association.



DIJKSTRA... "a new dimension of complications."

## Food for thought on distributed systems

THE theme of the Newcastle seminar was distributed computing systems, and Professor Dr Edger Dijkstra of Burroughs offered delegates an argument which has proved useful in thinking about it.

"Distributed systems are fun, but they add a new dimension of complication," he said. "The model of the dining philosophers has proved a powerful one for all sorts of exclusion constraints. This argument is the result of at least five iterations, and it is a pleasure to present it because it is now so very beautiful."

Lack of space precludes presenting the argument here, but it

concerns a number of philosophers who spend their time either thinking or eating. A table is set out with a designated place for each philosopher and one fork at each place. Unfortunately, however, the meal is a difficult spaghetti which is inedible without the aid of two forks.

"When a philosopher is hungry, he has a number of options open to him: he can wait until one fork is free, grab it and wait for a second; he can wait until two forks are free and grab them both, but that is not very attractive, because if his neighbours conspire, they can starve him."

### Professor challenged by one of his peers

A UNIVERSITY professor is never more exposed than when facing a gathering of his peers. Professor Erich Neuhold, describing Porel, a distributed database system being built at Stuttgart University, was immediately challenged by Professor Dijkstra on his statement

that data should be stored close to where it is most frequently used.

He conceded Professor Dijkstra's contention that the criteria for location should be most urgent need as well as most frequent use, whereupon Professor Euan Page of New-

castle interjected that the two were mutually incompatible: one was based on forecasts of the future and the other on history.

"That is why designing a distributed system is so difficult," smiled Professor Neuhold.

### CA-DYNAM/D

#### Disk space and catalog

for DOS, DOS/VS users

### Like adding more disk drives ... for free!

By slashing disk space needs seven different ways, some of our clients calculate that CA-DYNAM/D paid for itself in less than three months.

Here's how! **One:** CA-DYNAM/D allocates only as much space as is actually needed ... and does it automatically.

**Two:** it automatically releases unused space. **Three:** it allows all partitions to share any one work area. **Four:** it limits fragmentation of disk volumes. **Five:** it allocates sequential files to be deleted automatically after closing. **Six:** the DYNVOT display and various disk space utilization reports help optimise use of devices.

Up To 40% Disk Space Savings

Disk space savings alone can easily run up as high as 40% in the average IBM centre running anywhere from four disk drives on up.

That adds up to a lot of extra disk drive capacity you can use to put off the day when you really need to add more drives.

We have a chart that shows you how much savings are required for CA-DYNAM/D to amortise itself within a given period of time. After that, it's pure profit!

**Plus Other Benefits**

Valuable disk space savings is only one of several other benefits you realise with CA-DYNAM/D.

For example, you can count on an immediate end-measurable increase in throughput. Aborted or bypassed jobs are eliminated. Programmer productivity goes up because there's no longer any need to map disk file addresses — or keep track of file size or other attributes. File security, too, is improved.

CA-DYNAM/D has a number of other features that help make it the fastest selling Disk Space and Catalog Management System sold today.

It's available to you entirely without obligation for a 30-day trial evaluation. Just call us — or send the coupon today!

**COMPUTER ASSOCIATES**

☐ Please call me, I'm interested in knowing more about CA-DYNAM/D

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

Telephone (area code) \_\_\_\_\_

Computer \_\_\_\_\_

System \_\_\_\_\_

David T.ory,  
Computer Associates  
(U.K.) Ltd.,  
Park House,  
Park Street,  
Park Street, Basing  
Stoke, Wiltshire,  
Wiltshire, BA2 9BT





# COGARVIEW

## We are displacing people in the jobs that they are happy doing —

THE computer industry seems to be in an unusual measure of agreement that 1977 was a great year, 1978 will turn out to have been even better and that 1979 is shaping up as the hottest 12 months in the industry's history. The mainframe don't seem to have been impacted by IBM's flurry of price cuts and new models: the minicomputer makers seem to be surviving the threat from Series 1 on the one hand and microprocessors on the other without difficulty; the plug-compatible firms are viewing the 303X line with, at least public, unconcern.

Yet we are told by the economists that we are failing to emerge from a dire recession, and by the unions that companies failure to invest in fueling a potentially dangerous level of unemployment that could lead to the collapse of Western civilisation as we know it.

All of which confirms the impression as many of us have had that the computer industry profits from recession as much as the arms industry profits from war.

example, where it has recently been calculated that the average cost of employing someone in 1980 will be just under \$20,000, a figure which includes, of course, all those Turkish road sweepers and Yugoslav chambermaids. Obviously if you can buy a machine for \$20,000 which will mean employing two people instead of three, you buy the machine and turn a healthy profit from the deal in 1981.

Of course, computers are creating unemployment. I cannot understand why there should be such controversy on this point. Is it because we are so conditioned by trade union propaganda that to admit such a thing is like owning up to extra-marital sex? Not many people are actually fired because a computer is going to take over their jobs, but many jobs disappear through what is euphemistically termed "natural wastage." And the result is the same, even if it's sugar-coated. There are more machines and fewer jobs.

Trade unions are, in part, to blame for this. Their wage demands, imposed with lamentably short-sighted determination, helped to fuel the inflation against which employers are not reacting. And their resistance to labour flexibility helped to make capital intensiveness preferable to labour intensiveness — a reversal of the historic relationship between the two.

Once upon a time labour forces were handled very flexibly by companies. If my workload as an employer increased, I hired extra people to cope with it. If it decreased, I fired enough people to restore equilibrium. On the other hand, if I bought a machine I had to continue bearing the cost of that machine whether it was in use or not. Obviously it was preferable to hire and fire people.

Today, almost everywhere in the developed world, the reverse is true. In some Western countries like Italy or Belgium, it is virtually impossible to lay people off at all. In others, it is very expensive and the legislation in relation to redundancy changes all the time.

Certain classes of jobs are developing that no one wants to do — at any price. The jobs which are short are those which many people would be happy to do. The list of socially unacceptable jobs will lengthen in something like proportion to the percentage of the population who go on to further education.

Such unpredictability makes business life impossible. If I hire someone today, I have only the vaguest notion of what it might cost me to lay him off, or maintain him in idleness, a year or two hence. On the other hand, if I buy a machine to do his job, no one is going to tell me that I cannot sell that machine off if I cease to need it, or that I will have to pay a special tax on it if it stands idle. I know the capital cost of the machine to start with. No trade union official is going to come and tell me in 12 months' time that the cost has suddenly gone up. I have a shrewd idea of what I can get for it if I have to get rid of it after two, three or four years. This is a basis on which I can plan. The labour market today provides no such assurances.

However, that's enough trade union bashing on my part. If the unions are economically short-sighted, is not the computer industry equally so?

It is, for instance, a feature of the present chronically high levels of unemployment in the West that they are selective rather than across-the-board. While there are long queues of skilled workers at the door counter, there are also long lists of unfilled vacancies at the Job Centres.

What's happening is that certain classes of job are developing that no one wants to do — at any price. The jobs which are short are those which many people would be happy to do. It's a fair prediction that the list of socially unacceptable jobs will lengthen in something like proportion to the percentage of the population who go on to further education.

In Sweden, for example, it is reckoned that 75 per cent of workers will have post-High School qualifications of some sort by the end of the century. Who wants a diploma to empty dustbins?

But has the computer industry had the social and economic far-sightedness to predict this impasse and cater for it? No. The vast majority of computers are designed to displace people in the very kinds of jobs that people are happy doing — clerical and administrative work. You don't find many computers heaving coal, emptying dustbins, cleaning sewers or making beds.

Just as the trade unions do, ad hoc policies to deal with problems as they become acute, computer manufacturers have consistently taken the easy path, producing the system that could be configured or the least effort, equipped with the software that was easiest to write.

I have argued before in this column and elsewhere that methodology is needed to prevent the waste of technical resources and derive optimum benefit from what we have. Perhaps the computer industry should be a political and economic methodology to work out some global application priorities.

I have no figures, but I would be willing to bet that their portion of all R&D money in robotics is infinitesimal. At least some of the jobs that are going to become socially unacceptable involve relatively predictable sequences of activities which are probable within the grasp of existing technology. If properly applied, of course, are not. It's presumably by many years before we see the first robot emptying dustbins.

For that matter, how much money is being devoted towards the leisure contribution computers might make to alleviating the unemployment they cause. There are, to be sure, a few experiments in the field of electronic music, and videobased communications which have an eventual relevance to their social dimension is purely coincidental. Yet it is becoming a cliché, at least among computer people, that we all have to develop an enormous capacity for leisure in the future.

Just as the trade unions accept ad hoc policies to deal with problems as they become acute, so computer manufacturers have consistently taken the easy path, producing the system that could be configured with the least effort.

So what are we, who are supposed to glimpse most clearly what the need will be, going to do about it?

The argument at this stage, of course, is not about what governments might or might not do. It is about what governments, manufacturers and trade unions are prepared to do and consider a priority action for the future.

Could stand the industry's lites on their heads, I am not a frank, optimistic

George Cogar argues that the computer industry profits from recession as much as the arms industry profits from war. . . .

THE French Transpac network and Tymnet.

There is also IBM 2780 airline communication protocols and Tymnet's one internal protocol. The machine has been designed to accommodate up to 64 different protocols.

Digital Equipment's DDCMP and Burroughs' BDLIC are among a large number of others planned.

Tymnet II, the enhanced version of Tymnet being established around the new processor, is being implemented to ward off possible competition from AT&T's proposed US-wide Advanced Communications Service, and the ability to handle so

many incompatible protocols could prove crucial.

It will allow machines using one protocol to communicate with machines using any of the other ones accommodated on the Tymnet Engine.

Tymshare also plans to market the processors and software to other companies and organisations, both in the US and internationally to build their town networks.

Although the UK Post Office is planning to base its International Packet Switched Service on Telenet equipment, it is currently running the database access service on Tymnet equipment.

Adopting a computer-based system has split more profits for Frank Powell, estate agent of Wigan. Based on the UK produced BCL Molecular 18, the system has already increased the number of houses sold per week and allowed sales staff to give more time to interviewing clients. The picture shows one of the staff feeding information into the system.

And estate agents Whitegate in Yorkshire, Henning in Devon and Cornwall, and Frank Powell in the Wigan area also challenge the claim by West London estate agents Chadwick Bird and A. A. Dickson that they were the first to implement computer-based systems for personal home buyers (CW, August 24).

A spokesman for Whitegate, which is part of the Provident Financial Group, said that its offices have been using custom-built micro-based systems since January to handle the matching of property with a likely buyer, and the printing of address labels for mailing lists.

Built by Real-Time Computer Systems, each unit consists of an Intel 8080 microprocessor with four floppy disc drives and a Soroc VDU.

The Real-Time Computer Systems units will be marketed by PMSL, part of the Provident Financial Group, while Davison Technical Services is currently negotiating with BCL on the possibility of marketing its Molecular 18 system as part of an estate agent package. Chadwick Bird and A. A. Dickson both use Wang 2200 systems.

Property Information is input via the VDUs by using a screen format that matches the agents paper document layout. Once this is done, the whole day's input is then transmitted over Post Office lines to Provident Management Services' computer centre in Halifax where it is processed by the group's Univac 1108 to find buyer/property matches. It is then retransmitted to the source office.

Ten systems have been installed by Whitegate and another four are on order. Also, two systems have been ordered by Henning estate agents which has offices in Devon and Cornwall.

A system based on UK hardware, the BCL Molecular 18, is being developed for estate agents Frank Powell.

The Real-Time Computer Systems units will be marketed by PMSL, part of the Provident Financial Group, while Davison Technical Services is currently negotiating with BCL on the possibility of marketing its Molecular 18 system as part of an estate agent package. Chadwick Bird and A. A. Dickson both use Wang 2200 systems.

Property Information is input via the VDUs by using a screen format that matches the agents paper document layout. Once this is done, the whole day's input is then transmitted over Post Office lines to Provident Management Services' computer centre in Halifax where it is processed by the group's Univac 1108 to find buyer/property matches. It is then retransmitted to the source office.

Ten systems have been installed by Whitegate and another four are on order. Also, two systems have been ordered by Henning estate agents which has offices in Devon and Cornwall.

A system based on UK hardware, the BCL Molecular 18, is being developed for estate agents Frank Powell.

The Real-Time Computer Systems units will be marketed by PMSL, part of the Provident Financial Group, while Davison Technical Services is currently negotiating with BCL on the possibility of marketing its Molecular 18 system as part of an estate agent package. Chadwick Bird and A. A. Dickson both use Wang 2200 systems.

THE new 32-bit network — switching minicomputer designed from the ground up for implementation of a wide variety of communications protocols including the International X25 packet-switching standard has been introduced by the Tymnet subsidiary of Tymshare.

Tymshare is implementing a second generation of its large US Tymnet time sharing network and will progressively introduce the new processors, called Tymnet Engines, into its 320 node network. Most of the nodes in the network still use Varian 620 minicomputers, but about 25 use Interdata 7/32 and 8/32 machines.

Tymshare has offered the new processor to the UK Post Office as an alternative to the French Transpac and US telenet microprocessor-based X25 switches for the forthcoming UK Packet Switched Service which will succeed EPSS. So far, the Post Office has shown little interest, despite an offer from Tymshare to build the Engines in the UK if local manufacture is an issue.

The new processors are built up out of bit-slice micros and were designed around a new Tymnet-developed operating system called Isis. Internally-switched interface system.

A typical node configuration, capable of handling 32 synchronous lines running at up to 9600 bps, and 128 asynchronous lines running at up to 1,200 bps, with 64K words of main memory. All the protocols so far implemented, would cost about \$80,000. The network control node would cost about \$120,000.

Protocols so far developed include two versions of X25 — the one used by Telenet and the Canadian Datapac version, Snap. X75, the protocol for interfacing one packet network to another has been developed, and will be used for the link between

Aids for developing NS packs

FASTER development of applications software for the National Semiconductor Z8000 microprocessor is now possible, following the introduction by the company of a cross-assembler package for use on Intel MDS-800 and similar micro development systems.

It consists of a set of macros loaded into the macro table of the host development system, and in applications software development, uses the conventions associated with the development system. Output code is in the format of the host system, so allowing direct programming of memories, using available facilities.

Most directives, expressions and memory reference instructions are in the host computer direct and for the commonly used operators, high and low address orders, two special macros have been developed.

Staff priority

THE Computing Services Association has established a working party under Data Logic managing director Alan Thomas to tackle staff training, which the CSA regards as a "top priority". The working party has already initiated a study among CSA members on training needs (CW, August 31). At the beginning of next month the CSA and BCS will host a day in London for career advisers in further education and series of talks to sixth formers have already been started by the working party.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B7800 mainframe, originally scheduled for March, will now be made next month, to Isuzu Motors in Tokyo. The delay was caused by unexpectedly heavy demand for the older B7700 mainframe (CW, March 30).

Plotters launch

A RANGE of intelligent drum and flat bed plotters designed around a 16-bit microprocessor has been introduced by Computer Instrumentation Ltd. Called the CIL Series 4, the plotters are intended to relieve the load on the host mainframe. There are three drum plotters in the series, the 4/40, 4/50 and 4/60, and one flat bed unit, the 4/74.

Minimao launch

MULTIPLE access software announced by ICL in June for educational users of the 2803 has now been launched by the company for industrial and commercial users also. The system, Minimac (CW, June 1), supports batch working and concurrent online access from up to 32 terminals.

First B7800

FIRST deliveries of Burroughs' large-scale B



# Users begin to make their voice heard on telecomms policy

AS Congress and the Federal Communications Commission weigh decisions that could shape computer communications operations in the US for decades to come, a new voice is belatedly joining the chorus of special interests that always attends such deliberations in the nation's capital.

The voice is that of the user who had traditionally been a silent witness to decisions greatly affecting his or her destinies.

Until recently, computer and communications users were seemingly complacent about legislative and regulatory affairs. Travelling to Washington to present their views would mean time, money and effort that would have to be diverted from the primary task of getting

and keeping their systems up and running. Accordingly, by default, users handed over the forging of industry directions to AT&T and other vendors, with the resources to lobby on behalf of their interests.

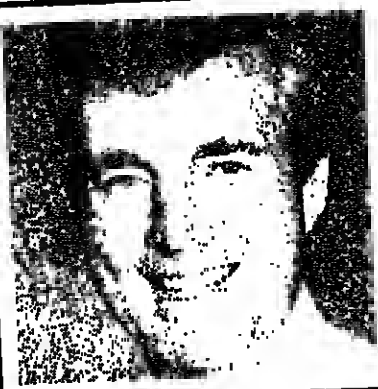
All that changed, however, with the introduction of the Consumer Communications Reform Act of 1978 - better known as the infamous Bell Bill - which would effectively have given AT&T a total communications monopoly.

Besides exercising both computer and communications vendors, the Bill struck home with using organisations which began to realise what non-representation in Washington could mean to the cost and manner of doing business.

Since then, Congress has

dropped the Bell Bill, but substituted more encompassing legislation aimed at re-writing the Communications Act of 1934, to bring it in line with modern technology. Similarly, the FCC has been conducting a second major inquiry into the relationships between computers and communications and how user interests might best be served by the merging of these technologies.

As if this were not enough to keep communications policy-makers busy, AT&T recently filed an application with the FCC to provide its Advanced Communications Service, which promises to revolutionise the makeup of the computer/communications industry and could mean the end of the next decade or more.



## By Morris Edwards

The potential of the telecommunications industry has long been understood by the companies that build the equipment and provide the services. It is from those quarters that the strongest representations have come when policies to guide and govern the industry have been under discussion. Now, the users are beginning to make their voices heard and in the US their lobby is becoming a force to be reckoned with. Morris Edwards looks at the current scene and at the organisations that are putting the case for the user.

Clearly, the time is ripe for user involvement in communications policy issues, and fortunately, the general business climate is favourable too. With today's highly competitive marketplace, corporations and other organisations that are heavy users of data communications have begun to look for ways to curb costs for these services.

Diligent communications managers have been able to take advantage of this mood to make corporate management aware of the bottom-line impact of current, as well as proposed, regulation and legislation. At the same time, using organisations appear more willing to address openly the issues without worrying about the backlash that could come from antagonising AT&T, IBM and other major vendors with political clout.

Likewise, as communications management personnel have become more visible both inside and outside of their organisations, they seem more confident in nailing their identity and views known.

Meanwhile, policymakers in Washington, recognising that they were principally hearing the slanted perspectives of competing vendors, were reaching out for the more objective insights of the users who would ultimately be the beneficiaries, or the victims, of their deliberations or conclusions.

Contrary to what they had been told was a supposed lack of interest in their views by the Washington establishment, users found it was not that hard to get an attentive audience.

Users, in fact, were a welcome, helpful and most credible addition to the Washington scene, where regulators and legislators recognised that users brought with them an objectivity and everyday real world knowledge of communications operations that could not be matched by vendors and other industry observers.

Even so, it was still a challenge for users to get involved with public policy matters within the constraints of frequently limiting corporate and organisational policies and the professional demands on their time.

A major breakthrough occurred when the West Coast based Tele-Communications Association, the nation's largest regional user association, passed a pro-competitive, anti-CCRA resolution on behalf of its membership. It comprises about 275 companies, including a broad range of industries, educational institutions and government agencies.

With the approval of at least two-thirds of its members, the TCA's landmark resolution supported a policy of continued competition in the private line and telephone equipment market, thereby opposing enactment of the CCRA in any form.

With this action, the TCA became the first communications user group to take a position on a national policy issue, and the association used the resolution as a springboard to present its user perspective at various Washington agencies and in Congressional hearings.

In the face of possible member dissension, and threats of withdrawal by some of its frightened constituent firms, the TCA boldly moved ahead and has emerged as a strong and informed industry voice. Its member mobilisation never materialised; its contributions to regulatory and legislative bodies have been significant and, most importantly, it set a needed example for other user associations to follow.

When the International Communications Association convened its national meeting in Las Vegas last May, there was already a groundswell of sentiment in favour of that prestigious and highly respected association taking part in policy debates.

Formed in 1948, the ICA has close to 400 organisations with slightly over 1,000 individuals from industry, commerce, government and education. Some of its members with experience in national policy-making and with the conviction that meaningful user influence was not only possible, but necessary, spearheaded what

turned out to be a clear-cut commitment to take a more direct and active role in the communications regulatory and legislative arenas.

Fueled by these precedents and already quite concerned about the potential impact of Washington events on data communications, another young user group, the Association of Data Communications Users was poised for its entry into the public policy arena, when a proposal for this activity came before its members at their annual gathering in Pennsylvania in June.

ADCU was only formed in November, 1975, but already has about 170 members, most of whom are member firms. At an annual meeting in June, ADCU established a Public Policy Committee to make reports and recommendations for concerted action that the association might follow on specific public issues related to data communications.

The committee is also charged to keep members informed of new developments, proposals, services, tariff filings and related matters of general concern emanating from federal, state and local regulatory, legislative and judicial agencies, departments and committees.

In addition, with the growth in public data networks in Canada, Europe and Japan, ADCU would like to work with similar user groups abroad to protect their interests related to international data transmission, the international public data network and like activities.

Interested parties should contact the association president, John P. Compitello, of International Paper Co., c/o ADCU, Box 1184, New York, NY, 10006.

**The time is ripe for user involvement in communications policy issues, and fortunately the general business climate is favourable too.**

While the user movement only now gaining momentum has already scored some successes, its going with its CCRA laurels. In the FCC Computer Inquiry II proceedings, for example, an ad hoc communications user committee gave one of the clearest and most useful insights into the issues involved, and it is believed that user viewpoint strongly influenced the ultimate findings.

Users also participated directly in hastily constituted eleven-hour efforts to the US Postal Service from coming a major, and possibly dominant, factor in the electronic mail business.

Although the USPS envisions the data communications market was aborted principally by the efforts of House communications, Sub-committee chairman, Lionel Van Der Hoven, and the CCIA, user influence were significant adjuncts to the pre-emptive efforts.

As the user movement continues to expand, there is being set for a pooling of association efforts to exert even stronger user influence. It is possible that the movement may also carry over into international arenas, as individual user firms become aware of how they can be in a position to line up benefits from a strong stance on communications policy issues.

COMPUTER WEEKLY/IDPM WORKSHOP

Computer Weekly in association with the Institute of Data Processing Management present

## Successful User Relations

A PRACTICAL WORKSHOP ON EFFECTIVE COMMUNICATION BETWEEN THE DATA PROCESSING DEPARTMENT AND THE USERS

Tuesday, October 17, 1978, at the Holiday Inn, London

COMMUNICATION BETWEEN THE DATA PROCESSING DEPARTMENT AND THE USERS

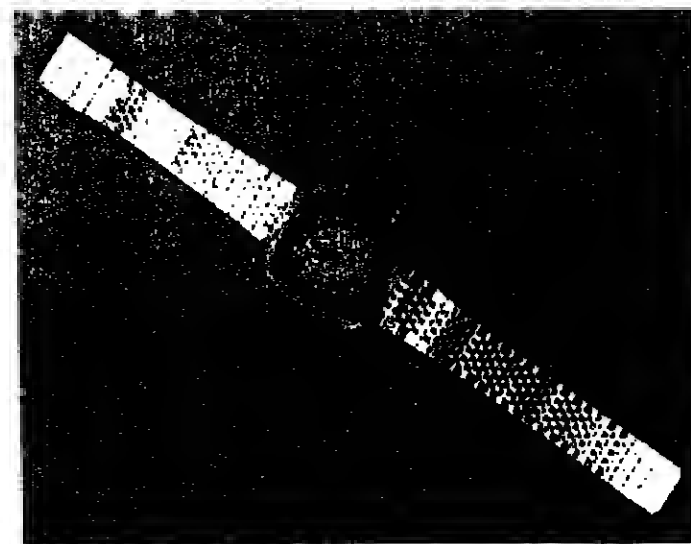
### MICRO NEWS

#### TI offers the 'time indicator'

OVERCOMING the difficulties previously encountered with standard 1.5 circuits in driving liquid-crystal displays, Texas Instruments took the idea of digital watches back to the drawing board and has come up with the first electronic quartz analogue watch.

Called "The Time Indicator," the watch has a low-voltage ester based material for the display, which enables an LCD representation of the hour and minute hands to be given, so replacing the digital numerals of standard LCD/LED watches.

Power for the watch comes from a lithium manganese dioxide cell.



The first liquid-crystal display analogue watch is now available from Texas Instruments for about £150. Four models are to be produced and they will be marketed under the name of "The Time Indicator."

#### Quick response to DoI's £15 million MAP scheme

THERE has been a quick response to the Department of Industry's £15 million Microprocessor Application Project scheme (CW, July 13) and the first funds have already been allocated to support work on the development of a new application.

MAP covers three areas - training and courses, handled by the National Computing Centre in conjunction with the DoI; feasibility studies carried out by authorised consultants and controlled by Warren Spring Laboratory; and the funding of applications which is dealt with by DoI headquarters in London.

In this last part of the scheme there have been over 1,700 inquiries from companies seeking further information and over 40 projects have been put forward for funding. The applications cover a very wide range of industries and products including weighing machines, transportation, machine tools, business machines, instruments, agricultural equipment, vending machines, chemicals, heavy industrial equipment, textiles, household goods and games.

Under the consultancy section of the scheme nearly 50 companies have so far responded to the invitation to be registered as authorised consultants and the department is waiting for replies about 70 others. The main condition for being included in the MAP Consultants list is that the applicant must have successfully completed a project using micro.

One of the first to join Mapcon was Mektronic of Manchester, and managing director Brian Benister commented on the speed with which the DoI had got the scheme off the ground. Companies wishing to develop micro-based systems will be directed to authorised consultants such as Mektronic who will carry out a feasibility study. Under Mapcon up to £2,000 of the cost of the study can be recovered.

At present Mektronic is offering a "menagers' teach-in," at £99 a time plus travelling costs, which is designed to tell managers what microprocessors are, what they can do, how they are used and what they cost.

#### Zilog dialogue

A ONE-DAY seminar will be held in London and Manchester, next month, by Zilog and its distributors Cramer Microsystems, aimed at software houses and business systems specialists.

Five speakers from the two companies will review new products and applications, particularly in Zilog's MCZ range of microcomputers, as well as already available software, including Cobol, Extended Basic, Fortran and PLZ.

The Zilog dialogue, as it is called, will take place in London on October 10 at the British Academy of Film and Television Arts and in Manchester on October 10 at the Playboy Club.

Edited by Martin Banks

## Sales jobs pay better than marketing in US components industry

CHIEF sales executives in the US electronic components industry earn more than chief marketing executives, according to a study by the Venture Development Corporation, the electronics industry consultancy, of Wellesley, Massachusetts.

The study, Marketing Policy: Electronic Components, shows that the salaries of chief marketing executives in all sizes of components companies are usually in the \$25,000-\$30,000 per year range while their counterparts in sales often receive over \$30,000 in medium-size companies, with the figure rising to \$40,000 in large concerns.

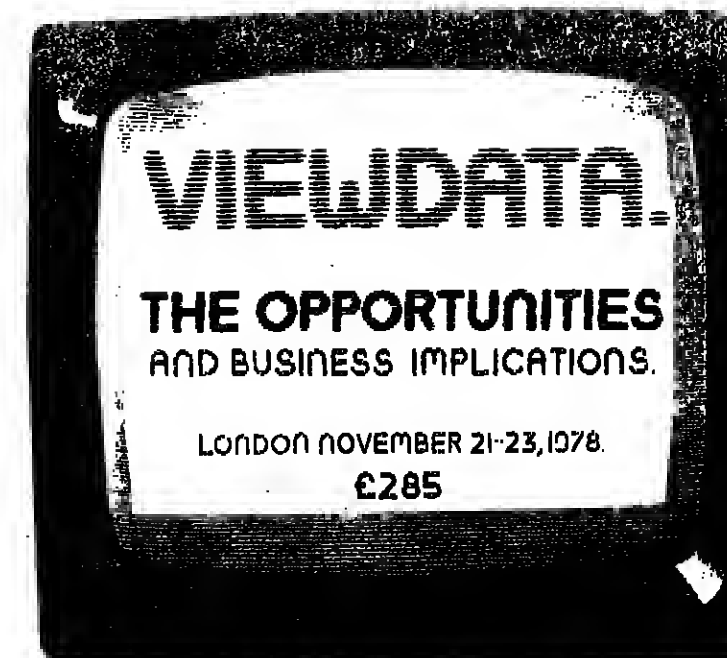
The study also shows that autonomy is often the prime motivating factor for chief marketing and sales executives and not money, as one might have supposed. But despite its importance, components companies often ignore autonomy as a means of attracting personnel,

preferring instead to concentrate on "accoutrements of office."

Another finding of the VDC study is that small electronics components companies with annual sales of less than \$10 million frequently carry out more market research than medium-size firms with sales of \$10-\$25 million per year. Although very small companies do practically no formal market research, activity increases in companies selling more than \$1 million only to decrease in companies showing sales worth over \$10 million.

The VDC study aims to combine research into the marketing practices of electronics components manufacturers with specific recommendations for companies to implement. In addition to salary and market research, areas covered include organisational structure, comparison of differing distribution methods and handling of marketing budgets.

For those who know what it is but need to know how to use it effectively...



3-Day in-depth seminar by Sam Fedida, inventor and designer of viewdata and Rex Malik, media expert.

The Applications - Direct sales methods - publicity advertising - marketing - publishing - other media - information retrieval - office procedures - executive practice - management information systems - education in schools, colleges and in the home - business training - use of message facilities.

The Effect of Information Providers - The hardware - design of databases - design of dialogue - data entry - editing and updating - economics - international links.

Please send me a free brochure on the Viewdata seminar and details of your early booking discount.

Post please to:  
European Communication Consultants Ltd,  
20 Duncan Terrace,  
London N1 8BT  
or telephone 01-278 9517

Name \_\_\_\_\_  
Position \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
\_\_\_\_\_

GAMMA - THE SAFE ROUTE TO SERIES/1 - with COS/1 and COBOL.

**GAMMA**

Gamma Business Machines Ltd,  
Compass House, The Rowpaw, Nottingham NG1 5DQ.  
Telephone: (0802) 49655, Telex: 377817.



**CHRIS PRIER**  
Associated Managers  
01-281 8028

**LONDON**  
Tada Farid  
01-281 6097  
01-281 8019  
01-281 8099  
01-281 8174  
01-281 8464

**MANCHESTER/GLASGOW**  
Owen Kelly  
061-672 4211  
**BIRMINGHAM/BRISTOL**  
Paul McGowan  
021-358 4838

## COBOL PROGRAMMERS

**City CE5000 + Mortgage**

A major financial organisation based in the city wishes to recruit a number of capable programmers to join their rapidly expanding DP department. The company is interested in programmers with a minimum of one years experience preferably on ICL equipment.

The hardware in use is the ICL 1900 running under GEORGE II but plans are well advanced for an upgrade to the 2900 series so any experience gained on 2900 models would be advantageous. A competitive salary is coupled with an attractive benefits package which includes LV's, 4 weeks vacation and a subsidised mortgage.

Reference JC37/1

## RPG II PROGRAMMERS

**London (All Areas) £4000 to £6500+**

We have a varied selection of vacancies in all areas of London covering a wide range of programming experience. These positions cover a broad spectrum of the Computer Industry, ranging from large well established software consultancies and manufacturing companies to small retailing and publishing concerns.

The equipment in use includes all the IBM SYSTEM 3 series and ICL 1900 and 2900 mainframes.

All the companies offer attractive starting salaries, and fringe benefits vary from Free Lunches and Season Ticket Loans to Travelling Expenses and Annual Bonuses.

Reference JC37/2

## OPERATIONS

Junior and Senior Operators with experience on IBM, UNIVAC Honeywell, Burroughs, NCR, ICL, DEC and PDP are required urgently. Listed below are a selection of our vacancies: — if you don't see one to suit you, call us to find out about the many others we currently have available.

IBM	SYS/3	Ops Super	4 yrs	£6000
IBM	DOS	Ops Super	4 yrs	£6000
IBM	OS	Ops Supr	3 yrs	£5500
IBM	DOS	Shift Ldr	3 yrs	£5600
IBM	DOS	Snr Ops	2 yrs	£5300
IBM	OS	Shift Ldr	3 yrs	£5400
IBM	OS	Snr Ope	2 yrs	£4500
IBM	OS	Operator	1 yr	£4300
ICL	GII	Shift Ldr	2 yrs	£4500
ICL	GII	Snr Ops	2 yrs	£4300
ICL	GIII	Operator	1 yr	£4500
ICL	Manual	Snr Op	1 yr	£3800
ICL	2900	Operator	1 yr	£3500
Burroughs	MCP	Operator	2 yrs	£5000
Burroughs	MCPV	Operator	1½ yrs	£3600
Burroughs	MCP	Operator	1-2 yrs	£4500
Honeywell	OS2000	Operator	2 yrs	£4500
Honeywell	OS2000	Operator	1 yr	£4000
Univac	EXEC8	Operator	5 mths	£3500
Univac	EXEC8	Operator	2 yrs	£4500

## DATA CONTROLLERS

We have many positions, both Junior & Senior, at salaries up to £5000.

## RECRUITMENT CONSULTANTS

**West End £6500 to £9000+**

We are looking for people with several distinct qualities to join our team of consultants: people with the desire to make money, with a flair for assessing and communicating with others, and with the drive to succeed by sheer hard work. In return for these qualities Datascene will offer an ideal opportunity to use current DP knowledge in a varied and fulfilling role, working with both clients and our own consultants on all aspects of recruitment.

If you have experience within either Systems & Programming, or Operations, and would like more information, please call Phil Gascoigne.

Reference PG37/3

## SYSTEMS ANALYST

**City CE6500**

A prominent company in the sports and leisure industry is seeking an ambitious young analyst to join a team involved in the expansion of its existing system and the development of new commercial projects.

The person they want is a go-ahead individual with an eye to the future wishing to fully utilise his talents and add to his experience and expertise. The successful applicant will have a programming background, preferably in COBOL, and a minimum of two years analysis experience.

In addition to an attractive starting salary the company offers a first rate benefits package and excellent working conditions.

Reference JC37/4

# MANAGEMENT & EXECUTIVE SELECTION

telephone 01-637 9611

## AES WORDPLEX

## Sales People

**Midlands/Home Counties**

**c £12-£14K + Car**

Selling equipment in the forefront of technology requires salesmen who are experienced in the computer market of today and who are fully aware of the potential tomorrow.

Due to the recent merger of Britain's foremost word processing companies now forming the market leader in this rapidly expanding industry, new and exciting opportunities have been created for sales people to expand the current sales force.

To be eligible for this position you will have a proven sales record obtained in the data processing or office products industry. Working in the area stated above, you will be responsible for existing accounts as well as developing new business.

The rewards are a high basic salary, a first class commission scheme, company car and excellent client is the "new force" in the industry today the promotional prospects are excellent.

## Trainer Demonstrators

**c £4-£4½K + car**

Due to the current expansion a number of vacancies exist for Trainer Demonstrators with experience in the word/date processing or office products industry to support the sales team in the development of new and existing business.

The qualities required are a presentable appearance, the ability to be able to communicate effectively, some typing skills and the drive and ambition to develop your career further as opportunities exist to move over into areas of general management and systems specialisation.

Applicants without previous experience in these fields but with potential will also be given every consideration.

Contact Fay Ogilvie

Suite 201/6 Albany House 324 Regent Street London W1R 5AA 01-637 9611

**Libra Computing Limited**

## Senior Systems Analyst

**London**

**to £7K**

Libra is a small and innovative software house, a subsidiary within the Guinness group, specialising in Market Research Analysis, and specialised computer software.

They are currently installing a small but powerful Herle virtual memory computer system at their Bayswater offices.

On behalf of our client we are seeking a mature and adept ANALYST who wishes to remain involved in the technicalities of programming.

Your experience should include implementation of at least one complete system, and a good usage of IBM Assembler. Demonstrated supervisory ability is essential.

Useful additional experience would include Fortran, systems or software programming, and training or sales background, whilst knowledge of market research, interactive processing, minis, or ICL equipment would be an added bonus.

The appointment is at executive level, and will include supervision of several technical staff, as well as analysis and programming.

Benefits include pension scheme, life assurance scheme, profit sharing and LVE.

Applications should be addressed to DEREK PEARSON at the address below in the first instance.

Contact Derek Pearson

**MANAGEMENT & EXECUTIVE SELECTION**

**Datascene Recruitment Ltd**  
Sceptre House  
169-173 Regent Street  
London W1R 7FB

**datascene**

**01-439 7871**  
24 hour answer phone

## IBM Systems Programmers £18,000 p.a. Holland

- MVS/JES2-MAS
- VM/370-CMS
- BTAM-TCAM-VTAM/SNA
- IMS-TSO-VSPC-RJE

This is an outstanding opportunity for two experienced systems programmers to join a small professional team, responsible for all aspects of systems support in a multi-configuration environment. The working conditions are excellent and there is a very progressive attitude towards operating system development and the implementation of new software products. Applicants who must have several years OS systems programming experience, should have a naturally responsible attitude to their work and should be capable of working with the minimum of supervision. Employment will be on a long-term contract basis with our associate company in Switzerland.

For further details, write or contact Brian Bidson on 0734 791226 during office hours or on 03446 6385 during evenings or weekends.

**370 Software Support**

## WELLTRADE INTERNATIONAL

Our clients have immediate vacancies for the following:

RTT 1 CW — 2 SYSTEMS ANALYSTS for the NEW YORK OFFICE of a German Bank. Candidates should have experience of Foreign Exchange Systems. SALARY £32,000.

RTT 2 CW — PROGRAMMERS — To work on the development of word processing systems. Candidates should have experience in word processing of the IBM 360/50 series. Salary £25,000. Data Base Management. Linguistic Interface. I/O Suffer Management. Utilities Support. Text Editing. Compiler Development.

In addition a knowledge of SCPC would be an asset. SALARY RANGE 50-60 D.M. RTT 3 CW — SENIOR SYSTEMS PROGRAMMERS — Candidates should possess knowledge of — IBM OS VSI or 2, VM 370, DS/MVS interfaces, CCW Programming experience for disks & definite +.

In a different category our client also requires people with experience of systems, file applications and systems conversions using MVS JES3. SALARY RANGE 65-90,000 D.M. RTT 4 CW — SENIOR SOFTWARE DEVELOPMENT MANAGER — with a number of years experience with a manufacturer in large mainframe software areas.

RTT 5 CW — OPERATING SYSTEM DESIGNER — The successful candidate is likely to have thorough experience and will be able to relate user needs to operating system and language feature requirements. In addition it will be an advantage if he has translated such feature requirements into the design specs. for the development of operating systems in a high level language. SALARY RANGE 95-110,000 D.M.

RTT 6 CW — SYSTEMS DESIGNERS — With experience of all aspects of the design of an X-25 based packet switching system. SALARY RANGE 95-110,000 D.M.

RTT 7 CW — MICRO-SYSTEMS SPECIALISTS SYSTEMS ENGINEERS — With experience of one or more of the following: Systems architecture and hardware. Software design utilising Intel 8080s. The production of micro processor boards for industrial control applications. Candidates should have a working knowledge of German. SALARY RANGE 45-70,000 D.M.

RTT 8 CW — FORTRAN PROGRAMMERS — With 4-5 years experience plus knowledge of one of the following: Traffic Control Systems. Integrated Circuits. Quantity Surveying Applications. Candidates should have a working knowledge of German. SALARY RANGE 45-70,000 D.M.

RTT 9 CW — PROJECT LEADERS & SYSTEMS ANALYSTS — For manufacturing company based in Aachen. Candidates should have experience in one or more of the following: Factory data collection test stand. Plant Management. Process Monitoring/Control. Energy Management. Date Acquisition.

It is expected that in working in the area listed above candidates will have gained knowledge of: — Real Time Systems — O.P. Systems, Drivers & Data Communications. Candidates should have knowledge of German. SALARY RANGE 45-65 D.M.

Vacancy Ref. Nos. RTT2CW through RTT9CW are located in a beautiful part of Southern Germany close to lake and Alpine scenery.

Please write or telephone, quoting appropriate reference, to: Morris Sizer, Welltrade International Ltd., Redgeland House, 166 Dyke Road, Hove, Sussex BN3 1TF. Tel. 0273 (24821).

# What would make you take on a computer job in Aberdeen?

## The place?

Aberdeen, the Granite City, is almost certainly one of the most beautiful cities in Europe. It is surrounded by the scenic attractions of the Scottish Highlands and has for many years been one of the United Kingdom's main fishing ports. But now with the advent of North Sea Oil, it is an even more prosperous and thriving community. Aberdeen is a port, a University town, an excellent shopping centre, a forward looking city with a great future.

## The life?

All year round Aberdeen is a hive of activity; that goes for anything from mountain climbing to music making. It is only to be expected from the city that gave Scotland her first poet, her first performed play, her first poet, and all of Britain its first University course in Medicine! A city of sport, of the arts, of learning—a city with a rich past and an equally rich present.

## The climate?

Our climate is generally good, with hot summers that have made Aberdeen a popular holiday resort and sharp winters, which are an advantage for the winter sportsman or woman. We are within easy reach of Aviemore and Glenshee, with the Grampian mountains on the doorstep.

## The employer?

The North of Scotland Hydro-Electric Board is responsible for supplying electricity to over 25% of the landmass of Great Britain. We know our business and do our job well. Our accounting and engineering departments make extensive use of our computers and are now expanding their computer based activities.

## The money?

The panel opposite gives an idea of the salary scales we are offering, but the actual salary will depend entirely on you. Your experience and ability are what we need and we are willing to pay for it. If you are looking for a real career with opportunities for advancement in a growing organisation look no further. Assistance will be given with moving expenses where necessary.

## The challenge?

We are now expanding our computer centre in Aberdeen and will be installing a large new configuration with a comprehensive terminal network to replace our existing ICL System 4 computers.

Engineering programs extend through generation, transmission and distribution. Commercial activity— apart from billing, payroll and accounting— will be extensively developed into management accounting and enquiry processing. A challenge indeed, but if you think you can meet it read on.

## Commercial

**SENIOR SYSTEMS DESIGNER**  
£5495-£7145  
Minimum of 4 years' experience, ability to control projects.

**SYSTEMS ANALYSIS**  
£3985-£6130  
Minimum experience 2 years. Knowledge of business practice or O & M an advantage.

## Programming

**SENIOR PROGRAMMER**  
£4860-£6130  
Minimum of 3 years' Cobol experience. Ability to lead projects.

**PROGRAMMER**  
£3985-£5470  
Minimum of 18 months' Cobol experience.

## Engineering

**SENIOR SYSTEMS DESIGNER**  
£5495-£7145  
Minimum of 4 years' experience, ability to control projects.

**SYSTEMS ANALYSIS**  
£3985-£6130  
Minimum experience 2 years. Engineering background or qualification an advantage.

Salary and conditions of employment are in accordance with the N.E.C. Agreement for the Electricity Supply industry with placing on PAS Grade plus productivity payment currently giving the total earning potential as shown above.

If you are interested and want to know more about any of the above posts, contact our Computer Services Manager now.

**North of Scotland Hydro-Electric Board, Computing and Accounting Centre**  
Aberdeen Road West, Aberdeen AB9 2NY. Telephone (0224) 692471.

## Wrangler

## COMPUTER OPERATOR

Due to internal promotion Blue Ball Apparel Limited manufacturers of Wrangler Leisure Wear have a vacancy for a computer operator.

We are looking for someone who has an interest in programming and one to two years' experience of an IBM System 3 or similar commercial computer. You will become part of a small and friendly team, will be selected to frequent courses and be expected to work without supervision. We currently operate a two shift system — day and evening.

Remuneration and other terms of employment are commensurate with those of a large rapidly expanding international company.

Applications to Mr. Alan Osborn, Personnel Manager, Blue Ball Apparel Ltd., Colchester, Essex. Tel. Woodhouse 1570 (0206 451 304).

## FURTHER APPOINTMENTS APPEAR ON PAGES

38, 39, 40, 41, 42, 43, 44, 45,  
46, 47, 48, 49, 50, 51, 52, 53,  
54, 55, 56, 57, 58, 59, 60, 61,  
62, 63.







# KNIGHTS KNOW HOW

DATA PROCESSING CONSULTANTS SINCE 1970

## MINI PROG — LONDON

to £8,000

A bright future here, within computer services division of major financial and banking group for persons wishing to work on POP II mini computers. Company requires 2 persons at varying levels (i.e. 1-3 years), POP II, BASIC + and RSTS experience but will consider good maintenance and high level language to be trained.

- Broad new projects of financial and commercial nature.
- Opportunity to go onto MINIS.
- Good future and bright career.
- Benefits include sub mortgage after statutory period, profit share, flexi time, etc.

REF. 1769

## PROGRAMMER—CITY

£5,000c

Famous world-wide banking organisation, retaining amongst its various computers, IBM 370 hardware with T.P. monitor, has a rare opportunity for a programmer with good COBOL experience. Initially he/she will be involved in all aspects of programming but with a view to go into analysis and eventually be trained as a systems analyst.

- Long-term career prospects.
- Excellent training facilities.
- Fringe benefits include CHEAP MORTGAGE, subsidised restaurant, non-contrib pension and S.T.S.

REF. 1771

## PROGRAMMER — HANTS.

£5,000

Due to expansion and to cater for future needs the O.P. division seeks programmers to join their small friendly teams. They retain IBM 370 hardware and are seeking programmers ideally with at least 18 months' PL/I experience but are prepared to train COBOL, FORTRAN or ASSEMBLER programmers who would like to learn a new language.

Company offers

- Excellent prospects
- Full training in PL/I
- Subsidised MORTGAGE after statutory period
- Super working conditions including staff restaurant and non-contributory pension scheme

REF. 1779

## SYSTEMS ANALYST—LONDON

£7,500

Exciting and challenging opportunity awaits a systems analyst within this worldwide and prestigious company. Ideal applicant will have programming background in COBOL and ASSEMBLER and at least 2 years' systems experience. Our client is awaiting the installation of IBM 370 in October and this is a super opportunity to work in a brand new area on new projects.

Company offers

- Super working environment.
- Excellent career opportunities.
- Recruitment of own team.
- All new development work

REF. 1618

## PROGRAMMER — ESSEX

£5,000 + CO. CAR

Leading clothing manufacturer seeks prog with at least 18 months' exp. The O.P. dept at present is quite small but company is growing rapidly. Successful applicant will act as ASSISTANT to the D.P.M. This is a superb opportunity for young ambitious person wishing to develop with the company. They retain BURROUGHS hardware but will consider ANY HARDWARE EXPERIENCE. If you want a CHALLENGE telephone now.

Company offers

- Exciting growth potential.
- Highly progressive organisation.
- Excellent career prospects.
- RELOCATION expenses.

REF. 1703

## PROGRAMMER — LONDON

£5,500

Due to development of advanced computer systems, successful O.P. services department seeks to boost its programming team. Retaining large ICL 1900 equipment they offer excellent opportunities for persons with minimum COBOL and PLAN experience.

- Training on IMS Database.
- Development to analysis.
- Opportunities to join at senior level.
- Applications in various areas providing an absorbing and interesting career.
- EXCELLENT perks include FLEXI hours and 6 WEEKS' HOLIDAYS.

REF. 1780

## JUNIOR PROG — LONDON

£8,000

Multi national company retaining large IBM 370 hardware requires programmers with at least 1-2 months' ASSEMBLER experience, to join a highly professional team. They are currently developing a major sophisticated on line system.

Company offers

- Highly progressive organisation.
- Continued development with a well planned schedule.
- Excellent benefits including cheap travel
- Good promotional prospects

REF. 1764

## PROGRAMMERS—SOUTH COAST

£6,500

Major expanding British company seeks COBOL programmers, with minimum 2 years' experience. Retaining large IBM 370 and 3031 they are currently developing PL/I database and CICS and have on-going training and development programmes financed with substantial budget.

Company offers

- Pretty, coastal location.
- Good training and excellent scope to move into systems.
- Full RELOCATION expenses.
- MORTGAGE assistance, free life insurance, non-contributory pension scheme

REF. 1732

## PROGRAMMER — HOLLAND

£11,000

International company manufacturing sophisticated technical products for world-wide distribution seeks programmer for exciting newly-constituted position. Company have recently installed POP II using BASIC + and consequently require person with good knowledge of the same, with a good personality and strong desire to accept a challenge.

- Prestige company with good American backing.
- Good deal of development work using integrated database.
- Excellent prospects and early salary review.

REF. 1742

## MINI PROGS—LONDON/H. COUNTIES

£6,500 NEG

Progressive company operating on a global scale is recruiting persons with 1-3 years' experience in ANY MINI ASSEMBLER to work in their modern offices. Having large DEC POP II equipment and expanding at a rapid rate, they have wide range of on going projects both in hardware and software areas.

- Extensive training in up to date technology.
- Excellent career opportunities for training in BASIC, PL/I and FORTRAN.
- Opportunity for further travel

REF. 1718

## PROGRAMMER—CITY

£6,000

Established Mechanical Bank has opportunity for person with COBOL and PL/I experience to join primarily as a programmer but also be involved with analysis. This position is in the "one man" area but company will consider any good commercial background. PL/I Database is currently being developed, for which FULL TRAINING will be given.

- Large budget allocated for training purposes
- Variety of new development including Database
- First-class opportunity to follow an exciting career path
- CHEAP MORTGAGE and insurance, low cost loans, pension locker scheme and sub four sports, social club

REF. 1711

## MINI PROG—KENT

to £5,500

Our client is an international company based close to beautiful countryside. They require programmer with 18 months' DEC BASIC BASIC + experience. The hardware is installed, offering new development in both mainframe and microcomputers.

- A challenging position with opportunities and variety of work.
- Stimulating by the nature of the work and training is very high.
- Attractive average terms, and conditions including 4 day week

REF. 1698

For further details ring our London Office—01-734 0152/3010 (24 hours)

## CONTRACT DIVISION

U.K.

IBM CICS ASS + PL/I  
IBM IMS COBOL  
IBM IMS COBOL  
IBM IMS PL/I  
IBM OS COBOL  
IBM OS COBOL TSO  
AN/PROG IBM OS COBOL TSO  
ICL 2903 COBOL

LONDON  
HERTS  
BEDS  
S. COAST  
S. COAST  
HERTS  
BEDS  
MIDOX

£230 p.w.  
£230 p.w.  
£230 p.w.  
£250 p.w.  
£200 p.w.  
£200 p.w.  
£220 p.w.  
£180 p.w.

HONEYWELL 6000 COBOL  
BURROUGHS 6700 COBOL  
POP FORTRAN RSXIM  
POP MACRO II + CORAL  
POP MACRO II RSXIM  
POP MACRO II RSXIM  
MINI, CORAL MACRO RTLII  
OR ASS

MIDOX  
SURREY  
BERKS  
MIDOX  
LONDON  
HERTS

£210 p.w.  
£200 p.w.  
£230 p.w.  
£230 p.w.  
£220 p.w.  
£220 p.w.

## OVERSEAS

SYSTEMS PROG CICS PL/I  
+ ASSEMBLER  
IBM MARK IV  
2800 VMEB/VMEK  
HONEYWELL LEVEL 61/  
OR LEVEL 62

HOLLAND  
HOLLAND  
LUXEMBURG  
HOLLAND

£400 p.w.  
£400 p.w.  
£350 p.w.  
£320 p.w.

SYST 10 ASSEMBLER  
POP FORTRAN KN OF FRENCH  
ADVANTAGE  
SIEMENS TELEPROCESSING  
ASSEMBLER + COBOL  
UNIVAC OMS

HOLLAND  
PARIS  
LUXEMBURG  
HOLLAND

£350 p.w.  
£400 p.w.  
£350 p.w.  
£370 p.w.

Phone now for immediate and future contracts  
Ring Christine Kay/David Hayton. Tel. No: 01-734 0152 (24 hours)

## KNIGHT PROGRAMMING SUPPORT LIMITED

27 NOEL STREET, LONDON W1. TELEPHONE 01-734 0152/6 (24 HOURS)

OFFICES: AMSTERDAM, PARIS, MANCHESTER, BIRMINGHAM

## Two top D.P. Professionals for sophisticated & complex installation

Cryoplants, a highly successful member company of BOC International Group, are world leaders in the design and manufacture of low temperature process plant. The Company has achieved a significant and continuing record of success in both home and world wide export markets.

The existing Outpoint runs linked to BOC Oilsolve's IBM 370, 168 mainframe computers, are planned to be enhanced to form a sophisticated Outpoint ARC configuration. Systems currently operational include shop floor control system, manufacturing planning, personnel information and financial control applications.

## Operations Controller

£6100-£7400 p.a.

We are looking for an experienced and motivated person to join our team as an Operations Controller. The successful candidate will be responsible for the day-to-day running of the plant and will be required to ensure that all operations are carried out in accordance with the company's policies and procedures.

**Cryoplants**

Strong leadership and management skills are essential, as is the ability to play a key role in providing a first class service to clients of on-line systems. The position should appeal to men and women, aged between 26 and 35, ready for their first major management role.

## Programming Supervisor

£5800-£7000 p.a.

We are looking for a senior programmer who is seeking to consolidate his supervisory experience. He or she will control in-house permanent program staff, contract staff and level price contract applications via software houses. Extensive experience of IBM OS/360 is essential and experience with a complex mainframe computer environment highly desirable. Exposure to high pressure contract programming sphere would be an advantage.

These positions offer a stimulating and interesting opportunity to join an ambitious development programme. Career prospects within the BOC Group are first class for suitably qualified and motivated individuals. Salary will be paid according to experience. The Company is located in North London and applicants will be required to relocate to the company's premises. To apply please send your CV to: The Personnel Manager, Cryoplants, Unit 10, Angel Road, Edmonton, N9 6BW. Tel. 01-803 13441.



## ADVANCED APPLICATIONS London, W.1

Due to an increasing volume of development work, our clients (a major West End installation using ICL 2980, 1900 and minis) have asked us to recruit for several career openings. These offer

- database, real time and communications applications
- the technical challenge of large-scale systems
- training in modern techniques
- good working environment (new offices, staff restaurant)
- sound career path and advancement prospects

## SYSTEMS ANALYSTS

£6000-£7000

These posts will interest analysts with limited experience at the lower end of the bracket to more experienced practitioners at the upper end. Your background could be on any applications and on any hardware.

(Ref. 672)

## SOFTWARE PROGRAMMERS

c. £6200

Here's an opportunity to learn about VME/B and IMS, and to use MAC and TP techniques. This opening will appeal to programmers who have worked in a software or systems programming role on ANY MAIN-FRAME.

(Ref. 800)

## APPLICATIONS PROGRAMMERS

Up to £5600

Do you want to gain experience of the latest ICL hardware and software at a professionally-run installation? Would database and real-time experience enhance your career prospects? You should have had two years or so as a programmer, ideally including COBOL. However, if you have used another mainframe language, retraining will be provided.

(Ref. 686)

## POTENTIAL SYSTEMS ANALYSTS

£4500-£5600

This is a rare chance for a programmer or analyst / programmer to move to Systems Analysis, and to play a meaningful role after training. Candidates should have a background of at least three years' programming, or a Computer Science degree, or a recognised analysis diploma. (Ref. 880) Please ring us for a confidential exchange of information. If more convenient, leave a message on our answering machine after hours and we'll phone you at home.

**EDP SYSTEMS** 01.637  
52-53 Margaret St. London W1N 7FF 5796

Data Processing Recruitment Consultants

## Mini Analysts+Programmers Holland

Salaries: £9.5—15K.

Our Client is a major International Systems and Software Development Group recognised as Market leaders in their field. Owing to continued expansion in a wide variety of applications areas including Data Communications, Message Switching, Computer Networking and Mini Computer Software, a significant number of experienced permanent personnel are urgently required.

Emphasis will be placed on technical achievement and in-depth experience in the areas of activity outlined above. Whilst a degree or equivalent qualification in either Computer Science or Mathematics is desirable, significant relevant experience will be considered in lieu.

Of essence is a solid Assembler background within a Mini-computer environment. Project locations throughout the Benelux provide a wide and interesting environment which include Amsterdam, The Hague and Rotterdam. Of prime importance is demonstrable enthusiasm to re-locate to the Netherlands for an extended period. Every assistance will be given in relocation, including cost of removal of all personal effects, initial accommodation expenses and a resettlement advance. Interviews will be held in London within 14 days and offers will subsequently be made inside one week.

Ref. 2474

## Main-Frame+Mini Programmers Greater Manchester

Salaries: £6—9.5K (a.a.e.)

A very prestige client with headquarters in London and regional offices located in Cheshire and throughout Europe urgently requires the following: Real-Time and on-line Programmers, Systems and Data base designers and compiler specialists with 2-5 years experience.

Of particular interest would be people with relevant experience in one or more of the following: IBM or ICL with Assembler, PL/I or COBOL and Ferranti, DEC

with Basic, RTL II or Coral, Also IMS or similar and Data Base design personnel are urgently sought. The scope of projects is both broad and demanding and certainly in keeping with the prestige of this client. You will play an important role in project development and the opportunity to enhance your technical expertise is one of the attributes of working with this reputable group. Fringe benefits are well above average and full relocation expenses will of course be met.

Ref. 2474

## Freelance IMS PL/1 Amsterdam

£400 p.w. Min. 6 months.

A Dutch client has an urgent requirement for two freelance programmers to join an existing team developing a range of applications suites using PL/1 under IMS (DB + DC). Suitable applicants will be well grounded in IMS applications programming and will have at least two years of PL/1 experience. Availability within a few weeks is of paramount importance. In addition to a very high rate of pay our client will take the unusual step of providing full relocation

costs and under assistance in location of a room in Amsterdam. They will also consider provision of paid temporary accommodation in the initial weeks of settling in. Applications will be varied, interesting and above all demanding. This contract is for a minimum of 6 months but may well be extended. Brief interviews will be held as soon as you can become available to be held in London or Amsterdam.

Ref. 2474

## IBM T.P. or Database C. London+E.E.C.

Salaries: £16K (E.E.C.) & 7—9.5K (U.K.)

A multi-national U.S. Corporation specialising in Teleprocessing and Network design and implementation has retained Logistix to seek out and identify senior personnel for their Central London and several of their E.E.C. based offices. In particular they require Business Analysts and Programmers. Suitable applicants must have current in-depth knowledge of either IMS (DB or DC), CICS/VS, TOTAL, SHADOW, ADABAS or similar T.P./Database software preferably in an O.S.

environment. Programmers will be using either COBOL or PL/I but BAL would be acceptable. The scope of projects in which our clients are engaged is very broad-based and should appeal to even the most demanding and forward thinking candidates. The very high salaries reflect the prominence which our client places on the acquisition of these key personnel. Early interviews are envisaged and offers will be made within 10 days.

Ref. 2474

## Micro or Mini Specialists South-East and North

Salaries: £5—9.5K + Overseas travel

Our prestige client has established the reputation as market leaders in their field and offers exceptional career prospects to ambitious and talented analysts and programmers seeking above all job satisfaction, forefront applications development, prestige associated with working for this acclaimed International Company and not least a salary reflecting appreciation of your true worth. Candidates should possess a minimum of 18 months practical involvement in applications or software design and development in either a computer, manufacturing or Systems House

environment. Those who have BASIC or Assembler language experience on Mini or Micro Computers particularly DEC PDP 11, DG NOVA/ECLIPSE and TI 900/9900 or specific Micro-Processors preferably Intel 8080/5, Zilog Z80 or Motorola 6800 will be ideally suited. In addition to an above market starting salary our clients offer excellent career advancement prospects and the opportunity to travel within Western Europe. Initial interviews on our clients premises will be held within 14 days.

Ref. 2474

**Logistix**, Freepost 32, London W1E 3YZ  
01-491 4636 Telex 28800  
(Reverse charge)



Avon House, 346 Oxford Street, London W1N 9HA